

HORTICULTURAL ABSTRACTS

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No. 1

Initialled abstracts and reviews are by Prof. F. G. Gregory of the Research Institute of Plant Physiology, Prof. J. T. Hewitt, T. N. Morris of the Low Temperature Research Station, Cambridge, R. J. Garner and H. B. S. Montgomery of the East Malling Research Station, and G. St. C. Feilden.

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MISCELLANEOUS.

General.

1. BRITISH COLUMBIA DEPARTMENT OF AGRICULTURE. 63(711)

Vancouver Island and Gulf Islands.

Circ. Dep. Agric. B. Columbia, agric. Settlement Ser., 2 (revised), 1946, pp. 23.

"There are few spots known to man where life can be lived more agreeably than on Vancouver Island", the foreword states, though it seems that fruit growers elsewhere have been able to make greater profits. The planting of tree fruits, with the exception of cherries, is recommended for small home orchards only, but strawberry growing is an old-established industry on the southern end of the Island. Other small fruits are also grown commercially, but the acreage has decreased recently, as it has with strawberries. Large-scale vegetable growing, bulb and flower growing, and seed production, both of vegetables and flowers, are expanding industries.

2. BRITISH COLUMBIA DEPARTMENT OF AGRICULTURE. 63(711)

The Okanagan Valley.

Circ. Dep. Agric. B. Columbia 40 (revised), 1945, pp. 36.

It is a matter of course that in a bulletin on the Okanagan Valley issued by the Ministry of Agriculture of the Province of British Columbia much space should be devoted to the fruit growing industry. In 1942, apple production, excluding crab apples, amounted to nearly 5 million boxes, the other top fruits taken together totalling less than 1½ million. Peaches, with a crop of over 700,000 boxes took the second place, followed by about 250,000 boxes of pears. Among small fruit, grapes were the leading kind with a production of about 206,000 baskets. The individual districts of the Valley are discussed with recommendations for suitable varieties to be planted in each, and notes on tomato and

early vegetable growing in the Penticon, and in the Oliver and Osoyoos districts respectively. Moreover, the Okanagan Valley is one of the principal seed-producing areas of the Province.

3. BASJUK, T. 63(47) Some results of work, and problems confronting agricultural research institutes. [Russian.] *Soc. Seljisk. Hoz.* (Socialist Agriculture), 1946, No. 1-2, pp. 57-62.

Towards the end of 1945 there were within the system of the Ministry of Agriculture of the U.S.S.R. 85 institutes, 363 experimental and selection stations, 76 experimental fields and 224 out-stations. Different branches of plant industry were studied in 605 scientific and research establishments, while the problems of animal industry and veterinary science were dealt with by 103 and 38 research bodies respectively. This survey includes a short account of the activities of the following institutes: The Grain Institute of S.E. U.S.S.R.; the Grain Institute of the Non-Black Earth Belt; the All-Union Institute of Oil Plants; the All-Union Hemp Institute; Mižurin's Research Institute; the Institute of Viticulture and Wine Industry; the All-Union Feeding Stuffs Institute; the All-Union Institute of Animal Husbandry; the All-Union Institute of Experimental Veterinary Science; the Central Asia Research Institute of Irrigation; the Transcaucasian Institute of Water Resources; the Kamennno-Stepnaja Selection Station; and the Gribovskaja Vegetable Selection Station. In addition, some information is given on the introduction of date palm, cinchona, tung, grapefruit, olive, sugarcane, guayule, krym saghyz, sweet potato, pomegranate, etc., into humid and dry subtropics of the Soviet Union. Finally there is given a detailed list of subjects for immediate research to be inaugurated by the above institutes. The programme comprises work in the

realm of grain production, oil plants, horticulture, vegetable growing, feeding stuffs production, textile crops, sugar beet, animal husbandry, veterinary science, forestry, land improvement, mechanization, and economics.

4. LOZA, G. 63(47)
Research at the Timirjazev Academy of Agriculture. [Russian.]
Soc. Sel'sk. Hoz. (Socialist Agriculture), 1946, No. 3, pp. 70-5.

On the occasion of the 80th anniversary of its foundation, a survey is given of the research work conducted at the Timirjazev academy. Its personnel includes 70 professors, 130 associate professors, 150 scientific assistants and many other research workers. A 12-point programme of investigations that were conducted in the previous 2-3 years is given in detail. This is followed by a brief account outlining the work carried out in each department: botany, plant genetics, horticulture, field husbandry, herbage and cereal crops, forestry, soil science, plant physiology and pathology, animal husbandry and nutrition, mechanization of agriculture, and economics.

5. TARČENKŮ, V. V. 58.006(47)
The Stalinabad Botanical Garden. [Russian.]
Sovetsk. Bot., 1946, 14: 1: 67-8.

This garden, founded in 1933, is administered by the Tadžik Branch of the Academy of Sciences of the U.S.S.R. and is situated in the foothills of the Gissar Range at an altitude of 846 metres. Its main task is the introduction into the Tadžik S.S.R. of tree shrubs and herbage plants. At the present time it has a collection of 460 species, 200 species grown in hothouses, and about 100 "flower" plants in the open ground. A short account of its pre-war activities and the programme in the post-war period is given in the concluding part of the paper.

6. SKAZKIN, F. D. 58(47)
The work of the Department of Plant Physiology at the Lesgaft Institute of Natural Science. [Russian.]
Sovetsk. Bot., 1945, 13: 4: 47-50.

The main activity of the department is the study of the influence of high and low temperatures, light and darkness, and large and small amounts of moisture, on seeds and whole plants, and on the dormancy of buds, tubers and bulbs. Among the plants studied were oats and other cereals, potatoes, the saffron crocus, cabbage, tomatoes, and carrots. The results of the investigations are presented very superficially.

7. ČERNOGOLOVIN, V. 634/635(47)
At the Far Eastern Institute of Agriculture and Animal Husbandry. [Russian.]
Soc. Sel'sk. Hoz. (Socialist Agriculture), 1945, No. 11-12, pp. 59-60.

Among the investigations carried out at the Institute, which was founded in 1935, the following, of horticultural interest, are very briefly touched upon in the present article: Three varieties of soybean, well adapted to the Habarovsk territory and giving high yields, have been bred by Zolotnickii. Bacterial manures have been found especially suitable for vegetables and potatoes. Among the vegetables and fruit varieties bred are tomatoes and cucumbers resistant to fungal and virus diseases. The Institute has made a collection of fruit and berry varieties. It includes 50 varieties of apple, 20 of pear, 8 of plum, 5 of cherry, 5 of apricot, and more than 50 varieties and species of black and red currants, gooseberry, raspberry, and strawberry. The collection also includes grapes found in the Far East. All those have been studied and their main characters recorded. There are local varieties of apple which come into bearing in 4 years, and of pear in 5 years from grafting. Artificial hybridization between local and western Siberian berry fruits has yielded valuable material to the breeder.

8. KOVALENSKII, G. V. 581.05
The theoretical foundations of the geography of cultivated plants. [Russian.]
Priroda (Nature), 1946, No. 1, pp. 35-44.

Plant geography includes the study of both wild and cultivated plants; but a study of the latter in relation to their environment and the influence of man has led the author to the conclusion that the geography of cultivated plants should be treated separately. In the course of the article he defines the scope of the subject in general terms, attempting no more than superficial references to examples of breeding and cultivation among horticultural and other crops.

9. LOUIS, J., and LEBRUN, J. 581.9(493)
Premier aperçu sur les groupements végétaux en Belgique. (A first outline of plant communities in Belgium). [English summary 11 l.]
Bull. Inst. agron. Gembloux, 1942, 11: 5-87, bibl. 63.

The authors, in surveying the geographical distribution of plant associations in Belgium, record 62 associations and 25 sub-associations grouped in 31 alliances and 21 orders. The significance of the study of phytosociology for agriculture and silviculture is discussed. The two latter are, in fact, applied phytosociology.

10. WELLENSIEK, S. J. 547.944.6: 575.243
Colchicine-mutaties en hun beteekenis voor de plantenveredeling. (Colchicine mutations and their importance for plant improvement.)
Jaarb. algem. Bond Oud-leerl. Inr. middelb. Landbouwwonderwijs 1942, pp. 103-12. [Received 1946.]

A brief introduction on mutations in general is followed by a review of work on mutations induced by the application of colchicine and on the significance of polyploidy in plant improvement. The author concludes that in practical plant improvement there is no indication at present that colchicine-induced mutations are of any importance.

11. GIBSON, T. 576.85
The *Bacillus subtilis* group in relation to industrial products.
Reprinted from *Proc. Soc. agric. Bacteriol.* (Abstracts), 1943, pp. 3.

The *Bacillus subtilis* group produces rotting of potato tubers and other living plant organs at relatively high temperatures. It attacks pectic substances and is reported as exerting a softening action on pickled vegetables, particularly cucumbers. Other activities of the bacilli of economic importance include proliferation during the fermentation of tobacco and the rotting of farmyard manure, especially the Edelmist type, in which a high temperature fermentation is promoted.

12. IGNATIUS, J. G. W., and BOOGAARD, J. L. 634+635+633.491(492)
Het verbruik van groente, fruit en vroege aardappelen in Nederland in der jaren 1934 t/m 1939. (The consumption of vegetables, fruit and early potatoes in Holland from 1934 to 1939.)
Meded. TuinbouwvoorlichtDienst, No. 41, 1946, 27 pp.

Statistics, with tables, figures and graphs, are presented to show the consumption in Holland during 1934-39 of fresh vegetables, fruit and early potatoes, and of processed products from 1937 to 1940.

Physiology.

13. NOGGLE, G. R. 576.312.35
The physiology of polyploidy in plants. I. Review of the literature.
Lloydia, 1946, 9: 153-73, bibl. 59.

The present paper is a review of the work that has been

carried out by many workers on the physiology of polyploidy in plants, and in it results are discussed under three main headings: 1. growth, 2. water relationships, 3. composition, (a) organic and (b) inorganic components. The chief points brought out in the discussions are: There is general agreement among botanists that polyploidy brings about a lower rate of growth. An increase in size of the plants, or of the cells, may or may not be brought about by chromosome doubling. Most of the experimental evidence summarized in four tables indicates that polyploid plants have a higher water content than diploids, a greater percentage of total sugar, non-reducing sugar, reducing sugar and starch, and an increased ascorbic acid content, while the diploid plants contain a higher percentage of nitrogen, cellulose, hemicellulose and crude fibre. From the tables it would appear that much of the work has been done on tomatoes, *Nicotiana* and *Petunia*.

4. GREBINSKIĬ, S. O. 581.12
Plant respiration from the modern point of view.
[Russian.]

Adv. mod. Biol., 1946, 22: 75-97, bibl. 142.

This is a review of recent work on plant respiration. The author concludes from the data available that respiration is a process providing the organism not only with energy but also with structural material for regenerating protoplasm and forming tissues.

5. DENNY, F. E. 581.192
Gas content of plant tissue and respiration measurements.
Contr. Boyce Thompson Inst., 1946, 14: 257-76, bibl. 13.

Apparatus is described and illustrated for extracting by vacuum the gas from plant tissues, and the amounts found in potato tubers, fruits of squash, apple and eggplant, roots of turnip and sweet potato, and corms of gladiolus, are given. Procedures for estimating the carbon dioxide content of plant tissues by an aeration method are described.

6. DROUINEAU, G., AND GOUNY, P. 581.144.4
Contribution à l'étude de la catalase des tissus foliaires. (Catalase in leaves.)
Ann. agron., Paris, 1946, 16: 34-50, bibl. 17.

After comparing two generally used methods of expressing catalytic activity the authors prefer that of the American school. Their observations on the relation between the enzymic reaction and temperature lead them, for catalase in the peach, to accept a coefficient of Van t'Hoff equal to 2 and a lethal temperature of 70° C., this temperature being maintained for one hour. In conformity with the results of this they found, in studying the action of pH, that acidity affected the activity of the enzyme adversely; the activity at its maximum between pH 7.3 and 7.9. Hydrocyanic acid has a strong inhibiting action on the catalase. The activity of catalase is greatly diminished in the leaves of plants affected by lime-induced chlorosis, its value being only a quarter of that of normal green leaves.

7. DUBININ, N. P. 581.175.11
The inheritance of biochemical properties which influence the colour of flowers. [Russian.]
Adv. mod. Biol., 1946, 21: 341-56, bibl. 37.

A general review of the literature on the genetics of the biochemistry of plant cells in relation to the inheritance of colour in flowers.

8. KNIGHT, B. C. J. G. 577.17
Growth factors and growth inhibitors for micro-organisms. [Russian, English summary.]
Biochimija, 1946, 2: 73-88, bibl. 35.

The most important types of growth factors and growth inhibitors are surveyed, and their relation to metabolic processes is stressed. It is pointed out that many substances normally occurring in the intermediary metabolism may, in certain cases, acquire the properties of growth factors.

The conception of "essential metabolites" is shown to be of great importance in the study of growth and multiplication. Growth inhibitors may be regarded as "anti-metabolites". Examples are given of the intricate interrelations between metabolic reactions, physiological functions, the effect of growth inhibitors and growth stimulators. —Wellcome Physiological Laboratory, Beckenham, England.

19. ERMAKOV, A. I. 631.541
Biochemical changes in grafted plants. [Russian.]
Vest. Soc. Rast. (Soviet Plant Industry Record), 1940, No. 2, pp. 57-67.

Sunflower was grafted on Jerusalem artichoke and vice versa. On comparison with control plants of both species, it was seen that the scion and stock had exerted a mutual influence as a result of which they both differed biochemically from the control plants. It is believed that, in addition to the change observed in the biochemical processes of the roots, stems and leaves, the seeds also must have undergone profound changes which will affect their genetical constitution.

20. FERRI, M. G. 635.64: 577.17
Preliminary observations on the translocation of synthetic growth substances.
Contr. Boyce Thompson Inst., 1945, 14: 51-67, bibl. 25.

Synthetic growth substances applied as solutions to the soil of potted tomatoes and *Cleome* plants can be absorbed and transported upward in an amount sufficient to induce root formation on leaf cuttings taken some time after treatment. Indolebutyric, naphthaleneacetic, indoleacetic, and 2,4-dichlorophenoxyacetic acids were tested.

21. FLOOR, J. 577.17
Nieuwe toepassingen van groeistoffen. (New methods of applying growth substances.)
Tuinbouw, 1946, No. 6, pp. 21-2, No. 7, pp. 20-1.

A survey of recent research on the application of growth substances to horticultural practice, with special reference to work carried out in the United States and in England. It deals with the prevention of early fruit drop, spraying to delay leafing-out, the inducement of rooting, weed destruction, and the production of parthenocarp.

22. SYNERHOLM, M. E., AND ZIMMERMAN, P. W. 577.17
The preparation of some substituted phenoxy alkyl carboxylic acids and their properties as growth substances.
Contr. Boyce Thompson Inst., 1945, 14: 91-103, bibl. 39.

Directions are given for the preparation of substituted phenoxy alkyl carboxylic acids, and for testing them as plant growth substances. The results obtained indicate that halogen atoms or methyl groups are of the most importance in lending activity for cell enlargement to the phenoxy alkyl carboxylic acids. The halogens are generally more effective than methyl groups.

23. SHEAR, C. B., CRANE, H. L., AND MYERS, A. T. 631.8
Nutrient element balance: a fundamental concept in plant nutrition.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 239-48, bibl. 22.

The concept that nutrient-element balance and intensity within the plant are the controlling factors in determining the growth responses and symptom expressions of plants, put forward by Lagatu and Maume for 3 elements at a time, is here considered for a greater number of elements, and the principles on which it is based are discussed and defined. The authors are convinced that the principles involved are generally applicable, and that the acceptance of leaf analysis as the most practical means of determining fertilizer needs depends only on the accumulation of enough data on each

crop plant, to allow of the setting up of standards on which to base interpretation.

24. BERTRAND, G., AND BERTRAND, D. 581.192: 546.35
Sur la présence générale du rubidium chez les plantes. (*Rubidium in plants.*)
Ann. agron., Paris, 1946, 16: 1-6.

Rubidium was found by spectrographic analysis to be present in all of more than 60 species of plants or parts of plants examined, including a number of cultivated plants. The results are tabulated for all the plants examined.

Soils.

25. CHAMINADE, R. 631.411.4
Sur une méthode de dosage de l'humus dans les sols. (*The estimation of humus in soils.*)
Ann. agron., Paris, 1946, 16: 119-32.

A method is described of extracting and estimating the amount of colloidal humus in soils. The method is stated to be easy to carry out and to be applicable to trials in series.

26. ISRAELSEN, O. W., CLYDE, G. D., AND LAURITZEN, C. W. 631.459: 631.67
Soil erosion in small irrigation furrows.
Bull. Utah agric. Exp. Stat. 320, 1946, pp. 39.

The results obtained in 3 years' preliminary field and laboratory experiments include the following: (1) Irrigation furrow slopes of 2% and higher are excessive in loose silty loam and sandy loam soils when streams of 10 gal. per minute or more are run into each furrow. (2) In furrow slopes of 3% or smaller less erosion is caused in flat than in V-shaped furrows.

27. KELLEY, O. J., AND OTHERS. 631.432
A comparison of methods of measuring soil moisture under field conditions.
J. Amer. Soc. Agron., 1946, 38: 759-84, bibl. 50.

The tensiometer, Bouyoucos block, thermal unit, and gravimetric sorption block methods of measuring soil moisture *in situ* and the conventional method of drying soil samples in an oven were investigated and used in measuring soil moisture changes in field irrigation experiments on three soil types, ranging from light to moderately heavy in texture. The data obtained at the same location by the several methods are presented and compared. A discussion is given of the theoretical aspects of the several methods. The authors' opinion of their practical uses and limitations is presented, based on the use of 13 sorption blocks and more than 300 tensiometers, 900 Bouyoucos blocks, and 150 thermal units in field experiments during a 2-year period. [Authors' summary.]

28. KAČINSKII, N. A. (Editor). 631.51
Soil as a factor determining the working conditions of agricultural machines. [Russian.]
Uchenye Zapiski, Počvovedenie (Sci. Mem. Lenin State Univ. of Lomonocov), Moscow, 1940, No. 44, 142 pp., bibl. 60. [Received August 1946.]

This is a series of six papers by the editor and his colleagues on theoretical and practical problems in relation to cultivation of the soil by agricultural machines. The data are presented in many tables and graphs.

29. HUNTER, A. S., AND KELLEY, O. J. 633.913: 1.414
A new technique for studying the absorption of moisture and nutrients from soil by plant roots.
Soil Sci., 1946, 62: 441-50, bibl. 7.

A new technique for the study of the behaviour of plant root systems in the absorption of moisture and nutrients from soil is described, guayule and alfalfa affording the plant material necessary.

30. VEIHMAYER, F. J., AND HENDRICKSON, A. H. 631.414
Soil density as a factor in determining the permanent wilting percentage.
Soil Sci., 1946, 62: 451-6, bibl. 6.

Evidence from grapevines in the field and from sunflowers in laboratory trials indicates that roots of these plants were unable to penetrate Bale (gravely loam) soil at an apparent specific gravity of 1.8 or above. Density alone cannot be taken as the limiting value of the ability of roots to penetrate a soil; the size of the individual pores may be the determining factor. It would seem from the experiments that the moisture equivalent and the permanent wilting percentage, in addition to being influenced by texture, are also influenced by the size of the individual pores when the soil is undisturbed and compacted. The results indicate the importance of compactness and size of pores as factors tending to accentuate the discrepancies between field and laboratory determination of the moisture properties of certain soils. Physical or biological determinations of moisture-holding properties of soils may be unreliable indexes of field-moisture conditions for highly compacted soils.

Noted.

31. BENNETT, E. 631.875
a The decomposition of certain plant tissues with and without added lignin.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 252-4, bibl. 9.
Materials: oat straw, timothy hay, maize silage and maize stalks.
b COCHRAN, W. G. 519: 63
Some additional lattice square designs.
Res. Bull. Iowa agric. Exp. Stat. 318, 1943, pp. 730-48, bibl. 5.
c KRASNOSVIL, A. A. 581.1
Modern concepts of photosynthesis. [Russian.]
Adv. mod. Biol., 1946, 21: 153-84, bibl. 89.
d ROESSLER, E. B. 519: 63
Testing the significance of observations compared with a control.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 249-51.
In the application of the analysis of variance.
e STOUT, G. J., AND HOLBEN, F. J. 631.432.2
Simple method for rapid drying of soil moisture samples.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 238.
Method described takes 2 hours.
f TRUMBLE, H. C. 551.56(94)
Agricultural climatology in Australia.
Reprinted from *J. Aust. Inst. agric. Sci.*, 1945, 11: 115-9, bibl. 24.
g WESTER, R. E., AND MEAD, W. J. 77: 634/635
A fruit ladder makes a versatile photographic tripod.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 235-7.
Preparation and use of a 10-foot ladder.
h WILLIAMS, R. F. 581.192: 546.18
The estimation of nucleic acid phosphorus in plant material.
Reprint from *Aust. J. exp. Biol. med. Sci.*, 1945, 23: 213-9, bibl. 11.
i WILSON, J. K. 577.16
Destruction of certain vitamins and pigments [in plants] by nitrous acid.
Mem. Cornell agric. Exp. Stat. 271, 1945, pp. 6, bibl. 5.

TREE FRUITS, DECIDUOUS.

General.

32. DAVIS, M. B. 634+635(71)
Fruits and vegetables [in Canada].
 From reprint *Agric. Inst. Rev. Canada*, 1946,
 1: 311-5.
 In the May issue of the *Agricultural Institute Review* appearing under the title *Canada's agricultural resources*, the Dominion Horticulturist describes the place which fruit and vegetable growing holds in the country's economy. Today, British Columbia outstrips all other provinces in actual fruit production, with Nova Scotia, Ontario and Quebec ranking second, third and fourth. Within the next ten years, however, the picture will have completely changed owing to heavy, new plantings, especially in Ontario. The average apple production in Canada now amounts to 2,000,000 bushels per year, but an increase to 20,000,000 bushels in the not distant future is anticipated. This development is partly due to an extension of the industry to the more severe climates of Ontario and Quebec, made possible by the advent of McIntosh and other hardy varieties, to the use of harder rootstocks and to a better tree building technique. Of the tree fruits the peach crop comes next to apples in importance, nearly nine-tenths of the total acreage (20,400) being in Ontario, with the balance in the southern half of the Okanagan Valley, B.C. Here, too, a great increase in production is expected very shortly. Pears, plums and cherries, though of considerably smaller acreage, are likewise concentrated in Ontario and British Columbia. Grapes occupy an acreage of 17,506, mainly in Ontario, the balance in British Columbia, while the bulk of the raspberry and strawberry production (about 16,000 acres) is divided between Quebec, Ontario and British Columbia. Among other small fruit kinds the recently introduced blueberry cultivation is expected to assume considerable proportions, especially in the peat lands of Lunenburg Island, British Columbia. Vegetables, excluding potatoes, are grown on 181,500 acres, of which more than half are in Ontario, Quebec with 45,830 taking the second place. For many years the bulk of Canadian-grown vegetables was produced by market gardeners, while more recently farmers have begun to specialize in staple vegetables, devoting large tracts of land to the mechanized cultivation of these crops. Very recently, however, due to high prices and the desire of many people to work small holdings, there is a trend back to smaller scale production, though in the author's view this tendency cannot be maintained long for economic reasons. A large proportion of the vegetables produced is destined for the canning industries. The latest branch of the Canadian vegetable industry is seed production, which was insignificant up to the outbreak of the second world war and within a few years has been able to develop a profitable export business. For some special crops, see *H.A.*, 17: 174.

33. NEW ZEALAND DEPARTMENT OF AGRICULTURE. 63(931)
Primary production in New Zealand.*
Publ. (out of series) Department of Agriculture, Wellington, 1946, pp. 102.
 Although none of the horticultural crops is listed under "Main agricultural products", fruit growing provides a livelihood for a considerable number of primary producers in the Dominion. Subtropical fruits are confined to northern coastal regions of the North Island, apricots and cherries thrive in the southern central regions of the South Island, while apples, pears, peaches and plums are grown almost everywhere. The approximate acreages under commercial production of the chief fruit kinds are: Apples, 10,300; stone fruits, 4,500; citrus, 1,900. The majority of orchards are of the 1-5 acre size, only 9 orchards being

over 50 acres. Small fruits are produced in sheltered positions in most districts. The area under outdoor grapes for wine-making, located mainly in Auckland and Hawke's Bay, is 700 acres, the estimated production of dessert grapes being at present 600 tons. Intensive commercial vegetable production in registered market gardens is carried out on 22,600 acres. In the field of seed production peas are largely grown for export purposes, and brassicas for the supply of the home market, which for many brassica crops has become independent of imports from Great Britain. A scheme of seed certification is operated by the Department of Agriculture. The chapter on climate and topography is also of interest to the horticulturist.

34. HEIDSTRA, G. 634.1/7(68.01)
Fruittelst in Zuid-Afrika. (Fruit culture in South Africa.)
Tuinbouw, 1946, No. 7, pp. 18-20.

Climatic and other conditions for fruit cultivation in South Africa are described, and a list is given of varieties commonly grown of apple, pear, peach, Japanese plums, European plums, and apricot, with their time of ripening, i.e. early, midseason or late. Cross-pollination is discussed in relation to varieties that should be grown together to ensure cross-pollination.

35. MACK, W. B. 634/635(73)
American horticultural science today.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 533-43.

This, the presidential address to the Society, is based on replies received from 80% of all American horticultural scientists. The author is enabled to show in tabular form the emphasis laid on particular aspects of research on individual horticultural crops. Projects include 221 on fruits, with apples (92) easily first, followed by peaches (44), grapes (36); 238 on vegetables, potatoes (62), tomatoes (35); 50 on flowers, roses (10); 71 on ornamentals, again roses (10). This applies to the state colleges, universities and experiment stations. A separate note is included from Dr. Magness on Research in the Division of Fruit and Vegetable Crops and Diseases of the U.S. Department of Agriculture. Its work is also organized on a crop basis. This, he considers, can roughly be divided as follows: (1) Production investigations 25%, (2) breeding for resistance, quality, etc. 35%, (3) disease investigations 20%, (4) transport and storage 20%. As regards the training of horticultural scientists in the State Experiment Stations and similar institutions, of 591 such scientists, of whom details are available, 192 have had training in plant physiology, 181 in chemistry and biochemistry, 107 in genetics and cytogenetics and 69 in soil technology. Magness replying with regard to the Departmental workers, while stressing the outstanding value of plant physiology, notes that of the Department's 186 full-time professional workers 3 are designated as chemists, 8 as biochemists, 3 as botanists, 13 as geneticists, 65 as horticulturists, 52 as plant pathologists, 34 as plant physiologists, 1 as a refrigeration engineer, 2 as silviculturists and 5 as soil technologists. The review also contains the instruction given in residential and in short courses in horticulture. Finally, it may be of interest to note that of the 591 staff members mentioned above their duties are as follows: 152 full-time research, 53 full-time resident instruction, 100 full-time extension instruction, 222 part-time research and resident instruction, 34 part-time research and extension instruction, and 30 part-time extension and resident instruction.

36. BROWN, D. S. 634.1/8: 371.2/3
The point of view in pomological instruction.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 526-32, bibl. 16.

This paper has arisen from the author's work in planning a

re-organization of the introductory course in fruit growing at Urbana, Ill. In his opinion what to teach depends on the concept that fundamentally the objective of the fruit grower is the production of a food of high quality and good condition at a profit. At Urbana primary emphasis is laid on the fundamentals on which practical fruit growing is based. The actual practice and technique of fruit growing are used to illustrate the dynamics of these fundamentals and to give solidity to scientific ideas which might otherwise remain as pure abstractions in the students' minds. The author describes how the course is developed on these lines.

37. MAINE AGRICULTURAL EXPERIMENT STATION.
634.1/8(741)

Fruits.*

Bull. Me agric. Exp. Stat. 442, 1946, pp. 266-87.

This is a report on the latest progress of a number of trials, including the following: From a long-time orchard fertilization experiment, carried out in a sod orchard with McIntosh and Northern Spy, it is provisionally concluded that the annual application of 200 lb. of hay mulch per tree in combination with N is desirable. The average increase in yield over a 3-year period as a result of the mulch treatment amounted to 1.8 bushels per tree. The addition of P and K did not give any further response. *Apple leaf scorch*, caused by magnesium deficiency, was successfully combated by the addition of 20 lb. of Epsom salts per 100 gal. of spray applied in the calyx and first and second cover sprays. Two years' trials showed that the addition of Epsom salts had very little effect on scab control, which seemed slightly improved in the case of lime-sulphur sprays and slightly reduced in the case of wettable sulphurs. *Hardy stocks*. The evaluation of intermediate stocks or trunk-formers for the quick production of apple trees was begun in 1940, when an experimental planting was made. A table shows the cumulative percentage of budding done in each of the 4 years required to top-work various trunk-forming stocks. On the basis of the comparisons reported, Antonovka Shafnam, Charlamoff, Kulon Kitaika and Bellfleur Kitaika are considered to deserve further testing in Maine. *Apple spraying with new fungicides*. Puratized, Isothan, Dithane, were compared with lime-sulphur for scab control in the 1945 season, which favoured the disease. None of the new fungicides equalled lime-sulphur in efficiency. *Apple fruit fly* (*Rhagoletis pomonella*) emergence in 1945 and 1946 was shown to proceed generally parallel to the dates of petal fall, although temperature and rainfall had important effects in timing its emergence. The addition of 2% oleic acid to a 15% lead arsenate and an 85% bentonite-sulphur dust was found to increase the deposit of arsenic on the foliage. The *oyster-shell scale* (*Lepidosaphes ulmi*) has become an increasingly destructive pest in Maine apple orchards, partly owing to a depletion of its natural enemies as a result of sulphur applications. It has also been suggested that the present outbreak consists of a strain especially resistant to insecticides. In experimental tests the dinitro spray, Elgetol, thoroughly applied as a dormant spray in the early spring at the rate of 1-2%, reduced the population of living oyster-shell scales to 3-4%. In order to avoid reinfestation within a year or two repeated treatments are required in orchards particularly suited to the development of the pest. *Small fruits*. The control of a number of blueberry pests is discussed, and some details are given of the experiments planned on the newly-acquired blueberry experimental farm.

38. JONES, T. H., AND ASHLEY, T. E. 634.1/8(762)
Home orchards in Mississippi.

Bull. Miss. agric. Exp. Stat. 393 (revision of *Bull.* 350), 1943, pp. 38, bibl. 27.

Growers in Mississippi are urged to plant home orchards on their farms, and instructions on establishment, management and varieties are given. The practices recommended are those used in the Experiment Station orchards. Most of the information presented relates to peach, grape and

bramble growing, but other top fruit, strawberries, figs and pecans are also mentioned.

39. DEBUISSON, J. 634.13
Culture du poirier. (Pear culture.)
Fruit belge, 1946, 14: 154-77.

An account is given of pear culture, with special reference to Belgian conditions, along the following lines. I. Climate (rain, atmospheric moisture, temperature, wind, microclimates—topography and aspect). II. Soil (physical and chemical properties). III. Manuring (soil correctives—green manuring and liming, fertilizers, mode of application—in furrows or by injection). IV. Grafting (for dwarf forms, for standard trees). V. Culture (distances and systems of planting, pruning, cover crops, re-grafting). VI. Spray programme (winter, pre-blossom and post-blossom).

40. BARLOW, F. D., Jr. 634.25(763)
An economic study of peach production in Louisiana.

Bull. La agric. Exp. Stat. 398, 1945, pp. 32.

In northern Louisiana the development of peach production on a large scale is envisaged by many farmers as an alternative to the declining cotton industry. The cost of establishing and maintaining a peach orchard and the returns from the enterprise are worked out. In the orchards surveyed by the author the Elberta variety accounted for 46% of the trees. Under Louisiana conditions the productive life of peach trees is believed to average 10 years. Out of 100 trees planted, farmers expect the following to be productive: 81 in the fourth year, 52 at the end of the tenth year, and hardly any after the fifteenth year.

41. MARISCO, D. F. 634.63(82)
Informe sobre aspectos olivícolas de la Provincia de la Rioja. (Report on olive growing in the Province of Rioja, Argentina.)
Bol. Univ. Buenos Aires, Fac. Agron. Vet. 24, 1946, pp. 8.

The Capital and Aranco Departments have the most olive trees. Varieties planted and composition of the olives are discussed.

Varities and breeding.

42. PALMER, E. F. 634.1/7(71)
Fruit varieties.
Bull. Ontario Dep. Agric. 430, revised 1946, pp. 58.

For an abstract of the first edition of this bulletin, see *H.A.*, 13: 726. The arrangement remains the same, but there are some slight changes in the variety lists. In part VI, Variety trials, the 1946 edition does not confine itself to named varieties, but lists, in addition, for some fruit kinds, unnamed seedlings and bud sports under trial.

43. LESLIE, W. R. 634.1/2-2.111
Variety notes on some tree fruits grown in prairie orchards.
Publ. Dep. Agric. Canada 780, 1946, pp. 27, being *Fmsr's Bull.* 135.

Comment is made on some 240 varieties of apples, crab apples, pears, apricots, plums and hybrids, sand cherries and sour cherries growing in Canadian Prairie orchards. The information supplied relates to the origin of a variety and to the general character of tree and fruit. The seasonal data refer to localities with climatic conditions resembling those at Morden, Manitoba. It is interesting to note that all apricot varieties grown in the Prairies have their origin in Manchuria and that a relatively high proportion of apple varieties come from Russia.

44. RIETSEMA, I. (Editor). 634.1/7-1.521(492)
Vijfde beschrijvende rassenlijst voor fruit, 1943. (The fifth descriptive list of fruit varieties, 1943.)
Instituut voor de veredeling van Tuinbouwgewassen te Wageningen, 64 pp., 35 cents.

An introduction describes, and shows on a map, the division

* See also *H.A.* 15: 973.

of Holland into 6 districts according to their climatic differences. References are later made to these districts with regard to their suitability or otherwise for particular varieties of fruit. Brief descriptions are given of rootstocks or tree fruits with special reference to the East Malling stocks for apples and pears. The rest of the brochure (pp. 16-64) is devoted to fruits (both tree and bush) grown in gardens; they are taken in alphabetical order and descriptions are given of the best known varieties with notes on various characters such as pollination (apples, cherries, pears), fertility, vitamin C content (certain apple varieties), etc.

45. BELOHONOV, I. 634.1/8(47)
Regional standardization of top and bush fruit varieties. [Russian.]
Soc. Sel'sk. Hoz. (Socialist Agriculture), 1946, No. 1-2, pp. 50-3.

Encouragement is given to the standardization of fruit varieties in different parts of the Soviet Union. In 1945 a large number of introductions were made, including over 200 varieties raised by Mičurin or his school. Details are given of the principal varieties of apples, pears, plums, cherries, strawberries, raspberries, currants, gooseberries, etc., for each of the following regions: (1) Southern; (2) Central (European Russia); (3) Volga; (4) Northern European Russia; (5) Ural; (6) Siberian; and (7) Far Eastern.

46. LAVRENKO, E. M., AND SOKOLOV, S. J. A. 634.1/8(47)
Botanical investigations during 1944 in southern Kirghesia by an expedition of the Academy of Sciences of the U.S.S.R. [Russian.]
Sovetsk. Bot., 1945, 13: 3: 71-2.

In the district of Dzelalabad on the southern slopes of the Fergana and Cortal ranges a large proportion of some 15,000 ha. is covered with fruit trees and bushes. Most of the trees are *Juglans regia*, but there are also many *Malus sieversii* with their large and very tasty fruit. Among the other species occurring in the area are *Prunus divaricata*, *Pirus communis*, *Cerasus erythrocarpus*, *Crataegus pontica* with very large edible fruit, *Berberis oblonga*, and *Amygdalus communis*. There are plantations of *Pistacia vera* on the lower slopes. The species exhibit much variability. The expedition studied the root systems, soils, methods of thinning, and other problems, the elucidation of which would enable the fruit-bearing trees to be effectively exploited.

47. FEDEROV, A. A., KRASILNIKOV, P. K., AND NIKITIN, A. A. 634.11
The biology of *Malus sieversii* (Ldb.) M. Roem. [Russian.]
Sovetsk. Bot., 1945, 13: 6: 5-18.

Although this species of apple produces abundant fruit containing normal seed, long grass, rodents and other animals prevent the seed from growing into trees. Trees arise instead from the numerous buds at the base of the trunk and along the horizontal roots of the old trees. It does not require any injury and the formation of a callus to induce suckers to sprout. If the horizontal roots are not too deep and the soil is sufficiently aerated, or if the parent tree is old or injured, suckers appear on the horizontal roots and these in time develop their own roots. A histological study of the tissues of the horizontal roots, the vertical roots sprouting from them and the suckers led the authors to conclude that the horizontal roots are true roots and not underground creeping stems, but that in function they resemble rhizomes, being well supplied with starch and other nutrients necessary for sending up suckers. *Malus sieversii* propagates itself under natural conditions not only by means of suckers but also of those branches which come in contact with the ground and strike root. It would seem that in the region of Fergana and the basin of the Kara-alma, where the study of *Malus sieversii* was made, conditions favour

vegetative propagation also in *Acer turkestanicum*, *Juglans regia*, *Crataegus altatica*, *Prunus ulmifolia*. Even *Abies semenovii* and *Picea schrenkiana* have been seen to send up stems from the base of the trunk and from the roots.

48. HABRAN, R. 634.13-1.521
Les six meilleures variétés de poirier à cultiver en hautes tiges. (The six best pear varieties for standard trees.)
Fruit belge, 1946, 14: 177-83.

The qualities of good pear varieties are discussed under: vigour, fertility, resistance to pests and diseases, time of ripening, quality of the fruit, its size and general appearance, storage. The chief characters are described of the six varieties considered by the author as the best for standard trees; these varieties are: Doyenné du Comice, Beurré Alexandre Lucas, Conference, William's Duchess (Pitmaston Duchess), Légipont, Beurré Bosc.

49. VAN CAUWENBERGHE, E. 634.13-1.521
Choix des variétés pour la culture commerciale du poirier en forme basses tiges. (The choice of pear varieties for bush trees.)
Fruit belge, 1946, 14: 184-201.

The author discusses the qualities looked for in a good pear and gives a list of 12 varieties, in order of maturing, that he recommends for growing as bush trees, starting with Précoce de Trévous and ending with Comtesse de Paris. Each of the 12 varieties is described under fruit characteristics, commercial qualities, cultural qualities, physiological characters and origin.

50. MEADER, E. M., AND BLASBERG, C. H. 634.11-2.111
Blossom hardness of forty-five apple varieties.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 58-60, bibl. 1.

Observations following a late spring frost at Burlington, Vt. Apart from late flowering varieties, which escaped lightly, varieties in the McIntosh group proved rather more cold-tolerant than those in the Delicious group. Many varieties which showed great blossom damage produced heavy crops, e.g. Melba, with 41% flowers injured, and Haralson, with 40% injured, had later to be thinned.

51. BLAKE, M. A., AND EDGERTON, L. J. 634.25(749)
Breeding and improvement of peach varieties in New Jersey.
Bull. N. Jer. agric. Exp. Stat. 726, 1946, pp. 20.

Following a brief history of varietal changes that took place in the New Jersey peach industry before breeding work began, facts are given about the 30-odd named peach varieties bred at the Experiment Station since 1914. The varieties are arranged in 4 sections according to ripening dates, viz. 15 July-10 August, 10 August-20 August, 20 August-5 September, 5 September-15 September. The chief characteristics of all the new varieties, including parentage, are tabulated.

Propagation and rootstocks.

52. RAGLAND, C. H. 634.1/8-1.535/541(762)
Propagation of fruits for the home orchard.
Bull. Miss. agric. Exp. Stat. 375, 1943, pp. 20.

The bulletin deals with the propagation of top fruits and small fruits, including pecans and figs. A special chapter is devoted to the care of top-worked pecan trees.

53. UPSHALL, W. H. 631.541: 634.1/2
The stub graft as a supplement to budding in nursery practice.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 187-9.

Notes are given on successful stub grafting trials at Vineland, Ontario. The growth was slightly less than that from buds, especially when the grafting was done late in spring.

The union was satisfactory but a slight crook in the trunk just above the point of union was noticeable. It is suggested that this feature can be made negligible by putting the scions as nearly as possible upright with the top bud of the scion on the inside as shown in the illustration. Hints on the operation for Ontario are given.

54. LARSEN, C. M. 631.535: 634.97
Experiments with softwood cuttings of forest trees.
[Danish summary 26 pp.]

Rep. 18 from the Institute of Forest Tree Breeding at the Arboretum of Horsholm, Denmark, being reprinted from *Det Forstlige Forsøgsvæsen i Danmark*, 1946, 17: 289-443, bibl. 151.

Extensive trials with soft-wood and semi-hard-wood cuttings of many species of broad-leaved and coniferous forest trees are described. The work deals mainly with the influence of external factors and the importance of the internal factors. The extra warmth of hotbeds was found materially to increase the speed of rooting and it enabled cuttings to develop satisfactory root systems before the onset of winter. A neutral medium proved more generally useful than an acid. Variable performance under a single frame-light was attributed to variations in the micro-climate. Norway Spruce cuttings, planted in gravel in September and watered with 0.2% nutrient solution, rooted much more readily than those treated with water only. A solution of double-strength (0.4%) failed to show any improvement over water. The nature of the material was decisive even under good external conditions. The time of collection was found to be of great importance, thus beech succeeded only in May and June. The time factor was not the same for both terminals and laterals on the same plant, which points to condition being more important than strict adherence to the calendar. Shoots with a short period of shoot elongation, such as beech and oak, have a shorter period for rooting than those which elongate over a long period, e.g. poplar, alder and larch. Short shoots should be planted intact except where the tip is very soft and inclined to rot. Root-pieces as a source of shoots for cuttings yielded excellent material and this practice is advocated. Cuttings from young seedlings, exhibiting characters associated with juvenility, generally rooted much better than those from mature plants, but there were exceptions. This performance was associated with the proportion of dry matter within the cuttings, low dry matter going with best rooting. In ash (*Fraxinus*) slender shade-shoots rooted better than strong shoots grown in full sunlight. It is suggested that vegetatively propagated *Picea* may prove less susceptible than seedlings to attack by *Fomes annosus* when planted in infected soil. R.J.G.

55. MOLOTOVSKIĖ, G. H. 634.63-1.541
Experiments in grafting olives. [Russian.]
Sovetsk. Bot., 1945, 13: 5: 35-7.

When the olive, as scion, was grafted on *Ligustrum vulgare*, *Syringa vulgaris*, *Fraxinus excelsior*, and *Jasminum fruticans* at the Zitomir Agricultural Institute noticeable changes were brought about in the appearance of the scion. An olive able to withstand cold was desired. Two methods of grafting were employed, namely bark and cleft. Bark grafting resulted initially in a larger proportion of unions many of which later proved weak, whereas cleft grafting resulted in a large proportion of failures at first, but the survivors proved firm and lasting. Healthy scions were produced on all the stocks. The following method of rooting olive cuttings was devised: Five to eight cm. below the union of an olive scion and *Ligustrum* stock the shoot was cut off and inserted in sand or soil up to the level of the union. When the *Ligustrum* struck root, the sand or soil was piled above the union, and in 1½ to 2 months' time the olive scion also rooted. The influence of the *Ligustrum* shoots had not yet been determined, so that the author cannot yet say for how long they should be left intact.

56. VAN DER LAAN, E. 634.11-1.541.11
Involed van 4 doucinonderstammen op de kroondoorsnede, boomhoogte en opbrengst van de appelvarieteit Early Victoria. (The influence of 4 rootstocks on the crown diameter, tree height, and yield of the apple variety Early Victoria.)
Meded. Direct. Tuinb., 1945, pp. 734-9.

Data obtained from 1937 to 1945 on trees of Early Victoria on four rootstocks, viz. E.M. I, XII, XIII and XVI are tabulated and examined statistically. They show that Early Victoria produces most vigorous growth and greatest yield on XII, the weakest growth and least yield on I, while the influence of XIII, XVI is intermediate.

Pollination.

57. MOMMERS, J. 638.1: 634/635: 581.162.3
Bijen en fruit. (Bees and fruit.)
Meded. Direct. Tuinb., 1945, pp. 745-9, bibl. 17.

A review of the literature on the influence of the honey-bee on the pollination and fruitfulness of crop plants, particularly fruit trees.

58. TAVERNIER, J., AND COUTAUD, J. 581.162.3: 634.11 + 634.13
Qualité germinative du pollen de quelques variétés de pommiers à couteau et à cidre et de poiriers à poiré. (The germination of the pollen of certain varieties of dessert and cider apples and perry pears.)
Ann. agron., Paris, 1945, 15: 365-78, bibl. 24.

The question of cross-pollination in orchards is discussed with particular reference to varieties of apple and pear cultivated in Brittany. The percentage germination of the pollen of certain varieties is tabulated and the blossoming period graphically illustrated. The effect on pollen germination of stigmas of various apple varieties placed with the pollen grains in sugar solution was investigated. Of the 9 varieties investigated the percentage germination of any one variety was distinctly increased in presence of the stigma of that variety, this increase being particularly marked in the two triploid varieties Belle de Boskoop and Reinette Grise du Canada. In most cases the introduction of a stigma of one of the 9 varieties favoured the germination of the pollen of those varieties and increased the percentage germination.

Growth and nutrition.

59. MASSIBOT, J. A. 581.14
La notion du rendement et l'expression de l'activité végétative des cultures pérennes. (The evaluation of yield and of vegetative vigour in perennial crops.)
Fruits d'Outre-mer, 1946, No. 13, pp. 392-9.

This article, which consists of extracts from the author's book "La technique des essais culturaux et des études d'écologie agricole", summarizes methods adopted by various workers for expressing the relation between yield and vigour, and for measuring vegetative growth in perennial crops. Details are given of the methods employed by Branas at Montpellier with the vine, and by Hoblyn and others at East Malling with deciduous fruit crops.

60. BAKER, G. A., AND BROOKS, R. M. 581.145.2: 634.55 + 634.21
Estimation of the later period of almond and apricot fruit growth from earlier measurements.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 93-6, bibl. 7.

Workers at Davis, Calif., describe a method for estimating the final size of almonds and apricots by observations of early fruit growth in the same season. Six average size determinations at weekly intervals sufficed with a 3-constant formula to determine the growth curve in Nonpareil almonds

even averages at 3-day intervals sufficed with a 4-constant formula to determine the growth curve of Royal apricots.

1. BROWN, D. S. 634.25-1.8
The growth and composition of the tops of peach trees in sand culture in relation to nutrient-element balance.
Bull. W. Va agric. Exp. Stat. 322, 1945, pp. 27, bibl. 20.
The following extracts from the author's summary represent selection from his results, which are supported by an impressive body of data: 1. Elberta peach trees were grown in sand culture, using 54 different treatments which included 1 of the possible combinations of supplies of N, P and K at three concentrations—high, medium, and low—and of Ca at two—high and medium. 2. The trees were lifted out five months after planting. Growth was measured in terms of the length and the dry weight of shoots. Samples of the leaves, shoots, and trunks were analysed for P, K, Ca, Mg and for water-soluble, water-insoluble and total N. Nutrient-element balance was defined and qualified in terms of the factors limiting growth. The nutrient-element supply with the highest intensity of balance was defined as that one with which resulted the maximum amount of growth possible within the limits of other environmental factors and of the genetic nature of the plant. 4. Nitrogen was the most important of the elements as a determinant of growth. Considering the experiment as a whole, maximum growth occurred when the N supply was medium regardless of the supplies of the other elements. 5. K and Ca were closely related and next to N in importance in their effects on growth. Within the limits of either the high or the medium N supply, there were two combinations of K and Ca which were nearly equal with respect to growth. They were high-K-medium-Ca and medium-K-high-Ca. P was the least important of the four elements as a determinant of growth. Growth at low P, however, was greatly reduced. 7. Growth was better with high-K-medium-Ca and medium-K-high-Ca than with medium-K-medium-Ca. 8. Under the conditions of low K, growth improved with an increase in the Ca supply. 9. Soluble N and P were lower in the leaves than in the shoots and trunks, while insoluble N, K and Mg were higher. Differences between the parts of the trees with respect to Ca varied with the Ca and N supplies. 10. Fundamentally, each element was antagonistic, at least potentially, to the accumulation of each of the others within the tops of the trees. 11. The apparent strength of the antagonism or repressive effect of the elements varied. A comparatively strong repressive effect was indicated for the following: the effect of P on N, the effect of N on K, Ca and Mg, and the effect of Ca on N, K and Mg. 12. Differences in growth (intensities of nutrient-element balance) were dependent on the relation of the soluble to the insoluble N as affected by the other elements in the shoots. An increase in growth usually resulted when the soluble N decreased relative to the insoluble portion. 13. The reduced growth with the low intensities of balance in the acute deficiency series was related to an inadequate synthesis of insoluble (protein) N. The diagnosis of acute and mild deficiencies was discussed.

Manuring and cultural practice.

- UPSHALL, W. H. 634.25-1.547.6
Fruit maturity and quality.
Bull. Ontario Dep. Agric. 447, 1946, pp. 15.
Consumer surveys conducted in Ontario show that in buying apples the purchaser looks for a reasonable amount of sugar, rightly believed to be associated with quality, for a size of at least 2½ in., for fresh fruit, for good quality and preferably a freestone peach, for maturity at time of purchase within a day or two, and for 2 or 3 days' keeping quality after fruit becomes eating ripe. The bulletin describes

how this can be achieved by cultural practices. (1) Avoid excessive vigour. Do not apply nitrogen if terminal growth of main branches is over 16 in.; if the growth is under 8 in. more nitrogen is needed. (2) In normal orchards cultivate in spring and early summer, stop cultivation from mid-June. (3) Prune lightly. The figures given from a pruning trial, carried out at Vineland on 3 varieties from the second to the end of the sixth year from planting, show how preferable light pruning (1.1 lb. per year) is to heavy pruning (2.9 lb.) in respect of yield (40 lb. per tree as against 18 lb.), precocity (52% as against 20% at first picking) and fruit colour. (4) Thin with the aim of obtaining the highest number of No. 1-size peaches; 30-40 leaves per fruit are recommended. (5) Carry out the complete spray schedule for rot and do not omit the pre-pick application. (6) Pick when the green from the ground colour is disappearing. The loss from windfalls in varieties other than Elberta has been greatly exaggerated. Losses in Elberta can be reduced by frequent picking. The Veteran, Elberta and Jubilee varieties had the following acid contents when picked at optimum maturity and tested at best eating stage: 0.9%, 1.2%, 1.3% respectively (3 years' average). Colour photographs show different stages of maturity and the effect of spraying on rot development.

63. THOMAS, W., MACK, W. B., AND FAGAN, F. N. 634.11-1.811.9: 546.27

Foliar diagnosis: boron in relation to the major elements in apple trees.

Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 26-34, bibl. 5.

Results at State College, Pa., serve to confirm the fact that boron is not a nutrient in the ordinary sense of the word but acts rather as an activator. Its relation to yields is indirect. There is no relation between boron and yields, although the most vigorous trees have a high boron content. A consistent relationship was found between boron concentration and the balance of nutrition with respect to the fertilizer elements, as expressed in the resultant NPK units. This relationship suggests a means by which deficiency or sufficiency of boron can be ascertained with respect to growth and yield of crop.

64. THOMAS, W., MACK, W. B., AND FAGAN, F. N. 634.11-1.8

Foliar diagnosis: an approach to the control of the nutrition of apple trees.

Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 97-106, bibl. 3.

The nutrition during two successive seasons of certain mature York apple trees growing under different systems of soil management and fertilizer applications was examined by the method of foliar diagnosis. It was found that nutrition differed widely among the trees, whether they were similarly or differently treated; no consistent relation could be found, therefore, among fertilizer applications, yield and nutrient content of the leaves sampled, in either of the two seasons considered separately. By making comparisons between the nutrition of each tree individually between one season and the next, in relation to differences in yield and to differences which were introduced into the fertilizer treatments between the two seasons, however, it was found possible to discover consistent relations among the fertilizers applied, the nutrition of the trees as reflected in the composition of the dried leaves sampled, and the differences in yield between the two seasons. These relations are described fully. It is apparent that the leaf content of nutrients in apple trees is influenced not only by the supply of these nutrients from the soil, but also by the individuality of the tree and by its condition with respect to fruit bearing. Consideration must be paid to these circumstances, if control of fruit production is to be obtained by means of leaf composition. [Authors' summary.]—State College, Pa.

65. WANDER, I. W. 634.11-1.84
The relation of total leaf nitrogen to the yield and color of Stayman Winesap apples at different rates of nitrogen fertilizer applications on sod.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 1-6, bibl. 4.
In trials at Wooster, Ohio, Stayman Winesap apple trees were grown in blue grass (Timothy) sod, cultivation with cover crops, and heavy straw mulch at 3 nitrogen levels—namely untreated, normal application ($\frac{1}{4}$ lb. NaNO_3 or equivalent) per tree, and triple this amount yearly. Facts brought out are that excessive nitrogen on sod depresses yield and gives badly coloured fruit. A lack of nitrogen on sod resulted in much reduced yields but well coloured fruit; this effect was not so pronounced in straw mulch or cultivation with cover crops trees. How and where the nitrogen decreased in the leaves during the season is discussed. Larger amounts of nitrogen were found in leaves from trees bearing little or no crop, whatever the treatment. Comparison of leaf analyses from orchards in other parts of Ohio lead to recommendations of nitrogen application in those orchards.
66. VISSER, W. C. 634.23-1.4
De groei van kersen in verband met het bodemprofiel. (Cherry cultivation in relation to soil profile.)
Meded. Direct. Tuinb., 1946, pp. 644-50.
The importance of acquiring information about the soil profile in orchards is stressed with special reference to cherry growing in Holland. Important factors in assessing the value of soil for cherries are discussed in relation to the depth of the polderwater below the surface of the soil, the silt layers, and the drainage depths.
67. WILCOX, J. C. 634.1/2-1.67
Orchard irrigation in British Columbia.
Publ. Dep. Agric. Canada 779, 1946, pp. 30, being Fmrs' Bull. 134.
Owing to the low rainfall in large parts of British Columbia, irrigation is necessary in most fruit growing districts, some of which are situated in semi-arid areas. The bulletin is an illustrated guide to irrigators, dealing more fully with furrow than with sprinkler irrigation, since the former is still in wider use to-day. The merits and de-merits of both systems are set out and the dangers of soil erosion are vividly pictured.
68. WELCH, D. S., AND MACDANIELS, L. H. 634.11-1.542
Apple tree pruning wounds. Treatment and healing in sound and winter-injured trees.
Bull. Cornell agric. Exp. Stat. 821, 1945, pp. 23.
A good wound dressing for apple trees should fulfil, among others, the following requirements: (1) durable under all conditions of exposure, maintaining a permanent and continuous cover, (2) not seriously injurious to freshly exposed living tissue, (3) impermeable, repellent or toxic to fungi and insects, (4) inexpensive and easy to handle. Of the many materials tested on pruning wounds of sound and frost-injured apple trees in a number of orchards, asphalt water emulsion, white house paint, fibrated asphalt paint, bordeaux paint and copper resin have shown considerable promise from the standpoint of durability and freedom from injury. None of the treatments applied prevented bleeding or decay of wood below pruning wounds in frost-injured trees. The effect of dressing materials on wood-decaying organisms has not yet been determined.
69. JAIVENOIS, A. 634.1/2-1.544.7
L'ensachage. (Bagging fruits.)
Courr. hort., 1946, 8: 243-4.
Bagging fruit, especially those of apple and pear espaliers, is described. The advantages are said to be (1) the appearance of the fruit is improved, (2) the fruit is protected from disease, (3) damage by insect pests is diminished, (4) early fruit-drop is avoided.
70. BATJER, L. P., AND THOMPSON, A. H. 634.11-1.55: 577.17
Effects of 2,4-dichlorophenoxyacetic acid sprays in controlling the harvest drop of several apple varieties.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 35-8, bibl. 1.
While this chemical was highly successful with Winesap, completely failed to control harvest drop in three other varieties tested at Wenatchee, namely Oldenburg (Duchess) McIntosh and Delicious.
71. HARLEY, C. P., AND OTHERS. 634.11-1.55: 577.17
2,4-dichlorophenoxyacetic acid as a spray to reduce harvest fruit drop of apples.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 39-43.
Preharvest spraying at Beltsville, Md, with -001 and -002% 2,4-dichlorophenoxyacetic acid alone and in combination with .5% Carbowax did not materially reduce fruit drop in Delicious, York Imperial and Golden Delicious, but was highly successful with Stayman Winesap.
72. THOMPSON, A. H., AND BATJER, L. P. 634.11-1.55: 577.17
The use of the airplane in applying hormone sprays for the control of pre-harvest drop of apples.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 44-8, bibl. 1.
It is estimated that 15,000 to 20,000 acres of apples and pear in the Pacific North West were treated with hormones from the air in 1945. Approximately the same amount of spray was used per acre in the conventional and in the aeroplane method of spraying, the spray being 10 p.p.m. in $\frac{1}{4}$ % "summer oil" and being much more concentrated from the air. The method of application is discussed. In some of the trials reported the normal method appeared to give greater intensity of effect, in others little or no difference was observed. The data evolved do suggest that the spraying of spur leaves alone on a fruiting spur suffices to delay abscission, which is contrary to popular ideas. It seems possible that the concentration from the air might be appreciably lessened without detriment to result.

Marketing.

73. RASMUSSEN, M. P., QUILTSUND, F. A., AND CAKE, E. W. 664.85+664.84
Fruit and vegetable stores as retail outlets for fruit.
Bull. Cornell Exp. Stat. 815, 1945, pp. 66.
Having made a thorough study of fruit marketing in New York by specialized fruit and vegetable stores, of which in 1939 there were about 3,500 in the metropolitan area, the authors publish many interesting findings, including the following: (1) When sales of specific varieties, grades and sizes were analysed, largest sales were usually at medium prices. (2) Six varieties accounted for 84% or more of the total tonnage of eastern apples handled each month. (3) In August, Gravenstein was the only variety handled in large volume, while Red Delicious was most popular in November and March. (4) About 51% of eastern apples were not marketed under any varietal name. The suggestion is made that retailers need education on types and varieties of fruit, on how to display them and how to avoid spoilage.
74. BLANCH, G. E. 634.11: 658.8
Apple quality and its effect on price and rate of sale.
Bull. Cornell agric. Exp. Stat. 820, 1946, pp. 50, bibl. 12.

- b BROOKS, R. M., AND OLMO, H. P. 634.1/8-1.521
Register of new fruit and nut varieties. List No.2.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
544-69.
- c CRAVENS, M. E. 634.11: 658.8
Retail and wholesale distribution of apples in
Upstate New York.
Bull. Cornell agric. Exp. Stat. 794, 1943, pp. 41.
- d JOHNSTON, S. 634.75-1.523
The Fairhaven peach.
Quart. Bull. Mich. agric. Exp. Stat., 1946, 29:
86-7.
A cross between J. H. Hale and South Haven.
- e TALBERT, T. J. 634.23 + 634.22(778)
Cherry and plum culture in Missouri.
Bull. Mo. agric. Exp. Stat. 307, 1946, pp. 16.

SMALL FRUITS, VINES AND NUTS.

75. KRONENBERG, H. G. 634.711
Zijn frambozen nog gezond te telen? (Can
healthy raspberries be grown?)
Meded. Direct. Tuinb., 1946, pp. 583-9, bibl. 6.
The question of raising stocks of healthy raspberries in
Holland is discussed in relation to the good results obtained
in England. The paper is illustrated by photographs of
virus symptoms on raspberries taken from the publications
of the East Malling Research Station.
76. BRIERLEY, W. G., AND LANDON, R. H. 634.711-2.111
A study of cold resistance of the roots of the
Latham red raspberry.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
215-8, bibl. 3.
The killing point of Latham roots in undisturbed soil
appeared to lie between -6° and -9° F. No injury
occurred from temperatures above -2° F. It proved
hardier in this respect than other varieties on which Carrick
reported some 26 years ago [*Mem. Cornell agric. Exp. Stat.*
36, 1920].
77. BRIERLEY, W. G., AND LANDON, R. H. 634.711-2.111
Some relationships between rest period, rate of
hardening, loss of cold resistance and winter
injury in the Latham raspberry.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
224-34, bibl. 21.
These studies under Minnesota conditions of hardness in
the Latham raspberry are generally useful as throwing light
on the objectives which the raspberry breeder for hardness
should have in mind. The authors consider that objectives
should include, in addition to a high degree of ultimate cold
resistance and ability to harden quickly, factors such as
(a) retention of cold resistance once acquired, (b) deeper
dormancy in order to avoid out-of-season bud activity, and
(c) ability to rearden, if initial cold resistance is lost.
78. WALDO, G. F., AND HANSEN, E. 634.715: 577.17
Effect of growth regulating sprays on certain
blackberries in Oregon.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
201-5, bibl. 1.
Three known trailing types of blackberry were sprayed with
aqueous solutions of 2,4-dichlorophenoxyacetic acid, a
mixture of 4-chlorophenoxyacetic acid and β -naphthoxy-
acetic acid during flowering, and the effect on berry size
and weight was noted. Marked differences in results were
observed as between the response of the different varieties.
Among results, which differed as between the different sub-
stances, were injury to flowers and increased size of drupelets.
79. JOHNSTON, S. 634.734-1.523
Observations on hybridizing low bush and high
bush blueberries.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
199-200.
The undesirable characters of low growth habit, dark fruit
colour and small fruit size were dominant or nearly so in
the first generation of hybrids produced in Michigan by
crossing low bush (*Vaccinium lamarkii*) and high bush
blueberry (*V. corymbosum*).
80. CHILDS, W. H. 634.734-1.531
Shredded sphagnum vs. peat and sand as medium
for transplanted blueberry seedlings.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
206-8, bibl. 6.
In greenhouse trials at Morgantown, W. Va, and under
identical conditions otherwise, 536 blueberry seedlings were
grown half in sphagnum, half in peat and sand. The
average increase in growth achieved in sphagnum over that
in peat and sand was 67.3 per cent.
81. BEIJERINCK, W., AND WASSCHER, J. 634.734-1.535
Resultaten van stekproeven met blauwe bessen
(*Vaccinium corymbosum* L. en hare hybriden),
gedurende de jaren 1941 tot en met 1943. (Trials
with cuttings of blueberry and its hybrids from
1941 to 1943 inclusive.) [English summary.]
Meded. Inst. toegepast biol. Onderz. Natuur,
No. 3, reprinted from *Landbouwk. Tijdschr.*, 1946,
58: 113-27.
Of the soil media used, peat-litter alone gave better rooting
with hardwood cuttings than peat-litter and sand or than
sphagnum. Results with softwood cuttings were best
when the cuttings were taken as early as possible after the
end of the first growth.
82. ILJINSKAJA, I. A. 634.75
Some information on *Fragaria vesca* L. [Russian.]
Sovetsk. Bot., 1945, 13: 3: 58-62.
The purpose of the investigation described was to find out
the habits of growth and propagation, and other data which
would enable the existing areas of the wild wood strawberry
to be extended, and its yield of fruit increased. An eco-
logical study of the plants showed that *F. vesca* is not a true
woodland plant, for it thrives best when given sufficient
sunlight, and is associated with plants which are not typical
woodland plants. Hoeing the plants does some good, but
planting them in a prepared area was found to be better.
Under suitable conditions a yield of 89 kg. per hectare was
obtained.
83. FEDOROVA, N. J. 634.75-1.523
Crossability of phylogenetic relations in the main
European species of *Fragaria*.
C. R. Acad. Sci. U.R.S.S., 1946, 52: 545-7.
The author has studied various hybrid combinations of
Fragaria vesca, *F. elatior*, *F. grandiflora*, and *F. orientalis*,
and here gives an account of his work.
84. JOHANSSON, E., AND OTHERS. 634.75-1.521
Sortförsök med jordgubbar 1937-1945. (Variety
trials with strawberries 1937-1945.) [English
summary 2½ pp.]
Reprint from *Årsskr. Alnarps Lantbruks-, Mejeri-
Trädgårdsinst.*, 1946, pp. 19-72, bibl. 11, being
Meddel. Statens Trädgårdsförs. 32.
The strawberry variety trials reported here were carried out
at Alnarp, Rånna and two other places. Swedish varieties
raised at Alnarp were compared with Southland, Deutsch
Evern, Abundance and others. Among the former group,
Inga came second to Southland, the heaviest cropper of the
lot, in respect of yield—at least at Alnarp—but proved
superior to Southland and Deutsch Evern in respect of

quality. Moreover, Inga is very useful for preserve purposes. Of the other Alnarp productions Stella, coming from the same cross as Inga, was found to be equal to this variety, while Luna is recommended for private gardens as a late variety of good quality.

85. SLATE, G. L., AND ROBINSON, W. B. 634.75:577.16

Ascorbic acid content of strawberry varieties and selections at Geneva, N. York, in 1945.

Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 219-23, bibl. 8.

The ascorbic acid contents as determined at Geneva, N. York, in 1945 in a large number of strawberry varieties and crosses are here recorded.

86. MECARTNEY, J. L. 634.75(748)
Growing strawberries in Pennsylvania.

Circ. Pa. School Agric. 290, 1946, pp. 33.

During the 5-year period 1937-1941 the strawberry acreage in Pennsylvania varied from 4,800 to 5,000; it declined during the war to 3,100. All aspects of growing the crop are discussed.

87. MANESS, H. 634.8(8)

Grapes in Latin America.

Agric. Amer., 1946, 6: 185-8.

Grapes have long been grown in Latin America for wine, raisins and fresh fruit. They are now being sent to the United States as fresh table fruit in the off season when North American grapes are not ripe. Brief notes are given on the cultivation of grapes in Argentina, Chile and Brazil. In the Rio Grande do Sul region of Brazil fully 80% of the grapes grown are Isabella. This variety, the first to prove successful, was probably introduced as a rootstock for the *vinifera* varieties. It is popular because of its exceedingly heavy bearing and its resistance to phylloxera; it has been known to produce up to 90 lb. per vine, with an average of about 25 lb.

88. WEBSTER, J. E., AND CROSS, F. B. 634.8-1.547.6

The uneven ripening of Concord grapes: chemical and physiological studies.

Tech. Bull. Okla. agric. Exp. Stat. T-13, 1942, pp. 48, bibl. 40.

The popular Concord grape does not ripen evenly in Oklahoma, and in many years up to 25% of the berries are still green at harvest time. A comparison of the composition of green and coloured berries shows that uneven colouring is caused by a partial sugar deficiency in the maturing grapes. Apart from the application of nitrogen fertilizers, which improved colouring slightly, all the treatments tested failed to give a positive response, while shading and irrigation near harvest time even proved harmful. There seems no other solution but to replace Concord vines by other varieties more suitable to the area. Very detailed tables and graphs show the course of seasonal changes in composition of grapes and leaves.

89. BRANAS, J. 634.8-1.541:11

Porte-greffes d'aujourd'hui. (Vine rootstocks of today.)

Prog. agric. vitic., 1946, 126: 279-84.

Forty-one varieties of grapevine rootstocks are to be found in the French nurseries, and 11 of them occupy 95% of the ground, Rupestris du Lot leading with 32.8%. The chief characteristics of these 11 varieties are described.

90. ALABOUVETTE, L. 663.25:631.875

Utilisation des marcs de raisins pour la fumure des terres. (Grape residue as manure.)

Prog. agric. vitic., 1946, 126: 337-8.

The writer advocates the use of the residue from grapes after extraction as manure. After distillation it contains on an average, per 100 kg., 0.7-1.1 kg. nitrogen, 0.1-0.3 kg. phosphoric acid and 0.5-0.7 kg. potash. Its acidity is so high,

however, that its decomposition in the soil is very small. To obviate this difficulty the "Roos" method of preparing it is recommended and described.

91. SALLES, R. 634.8-1.542

La taille de la vigne dans le Languedoc. (Pruning vines in Languedoc.)

Prog. agric. vitic., 1946, 126: 385-93, 127: 7-12, 29-34.

Vine pruning is discussed in relation to the vine shoot and its buds. A typical shoot (var. Aramon) is figured to show the buds at the various nodes, in order, and of what they consist. Four methods of training and pruning are described and illustrated, viz. Goblet, Royat, Guyot and de Quarant. An account is also given of pollard pruning [as carried out on willows] with particular reference to the conversion of Goblet plants to that system.

92. SIAENS, F. 634.51-1.541.5

Is noten griffelen moeilijk? (The difficulty of walnut grafting.)

Cult. Hand., 1946, No. 8, pp. 13-14.

A method of budding walnuts is described.* Using a knife with two parallel blades a strip of bark is removed from the stem of the rootstock. A "shield" of bark bearing a bud is removed from the scion, cut to the correct shape, placed on the exposed wood of the rootstock and bound into position with cellophane. The bud-wood is taken from special "mother" trees that receive special cultural treatment to induce them to produce strong, healthy shoots. The method may be used for top-grafting walnut trees.

93. CROCKER, W., THORNTON, N. C., AND SCHROEDER, E. M. 634.5-1.531

Internal pressure necessary to break shells of nuts and the role of the shells in delayed germination.

Contr. Boyce Thompson Inst., 1946, 14: 173-201, bibl. 17.

Walnuts, hickory nuts and butternuts were selected as the fruits to be tested because of the thickness and rigidity of the coats. A hole was drilled through the shell and the hole later threaded with a tapering male tap. A hollow tap with tapering threads was later screwed firmly into the hole and water and air pressure gradually increased until the coats broke. The amount of internal pressure required to break the shell of walnuts, butternuts, and hickory nuts is several times that estimated previously for breaking the shells of hazel nuts and *Pinus pinea*. Embryos of walnuts in intact shells in soil at 6° or 11° C. began to germinate after 90 days and continued to germinate to the end of the 150-day test period. At 17°, 23° and 28° C. no germination occurred even after 150 days. At the higher temperatures the embryos did not exert pressures sufficient to break the shells where the pressure required amounted to about 18 atmospheres. Breaking pressure data show that any collection of walnut and hickory nuts is composed of a mixed population that can be divided into two almost separate groups, even when the nuts are all from a single tree, a high pressure and a low pressure group. Histograms prepared from the data indicate skew distribution curves. Intact walnuts stored three months at 20°, 25° and 30° C. in moist peat germinated readily when a portion of the shell was removed from the radicle region.

94. ZARGER, T. G. 634.51-1.87

Mulching effects on the growth of grafted black walnut trees.

Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 178-80, bibl. 1.

Mulching the black walnut in the Tennessee Valley has already proved successful. In this article trials of different substances are reported. Judged on 5 years' growth of the trees, broom sedge (*Andropogon virginicus*) was most beneficial. Benefit was also significant from wheat straw

*See also *H.A.*, 8: 721.

and well-rotted hardwood sawdust, but not significant for sawdusts of well-rotted pine, new hardwood and new pine.

95. ROMBERG, L. D., AND SMITH, C. L. 634.521: 581.162.3
Effects of cross-pollination, self-pollination and sib-pollination on the dropping, the volume and the kernel development of pecan nuts and on the vigor of the seedlings.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 130-8, bibl. 7.

Trials at Brownwood, Texas, with the Jersey, Mahan, San Saba Improved and other varieties throw light on pollination problems of the pecan. In the varieties studied, self-pollination was followed by a much greater summer drop than cross-pollination. The percentage of nuts harvested and the size of the nut clusters were greater following cross-pollination than self-pollination, and the relative yield of saleable nuts was greater. Pollination of Jersey with sib varieties produced the same effects as selfing, but slightly less pronounced. The genetic constitution of the pecan is highly heterozygous.

96. DODGE, F. N. 634.521: 581.145.2
A study of the degree of filling of pecan nuts as affected by the number produced by the tree.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 139-46, bibl. 6.

Data from 7 pecan varieties at Shreveport, La, show that the percentage of well-filled nuts decreased with increased number of nuts borne. It is suggested that in some years more leaves are needed per nut properly to develop the kernel than in others.

97. BLACKMON, G. H. 634.521: 577.17
Experiments with growth substances on pecans.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 147-8, bibl. 1.

Growth substances did not check fruit drop in pecan. Seedlings grown from nuts soaked in naphthaleneacetic or indolebutyric acid produced stronger root systems than untreated. Nursery trees transplanted after immersion of roots in solutions of these substances responded well, but neither for them nor the seedlings would the process appear to be economic.

98. BLACKMON, G. H., AND WINSOR, H. W. 634.521: 546.27
a

Boron uptake in pecans.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 149-52.

First year's results in the orchard at Gainesville, Fla.

- b FEDOROVA, N. J. 634.75: 576.312.35
Cytology of polyploid hybrids *Fragaria grandiflora* × *F. elatior* and their fertility.
C. R. Acad. Sci. U.R.S.S., 1946, 52: 711-2.

- c JONES, D. F., AND SINGLETON, W. R. 631.521: 634.75 + 634.711

The improvement of naturally cross-pollinated plants by selection in self-fertilized lines. III. Investigations with vegetatively propagated fruits.
Bull. Conn. agric. Exp. Stat. 435, 1940, pp. 327-47, bibl. 5. [Received 1946.]
Strawberries, raspberries, blackberries.

PLANT PROTECTION OF DECIDUOUS FRUITS

99. MARCHIONATTO, J. B. 632.3/4(82)
Reseña de la sanidad vegetal en la Republica Argentina. (Review of plant protection work in Argentina.)
Publ. Univ. Buenos Aires Fac. Agron. Vet. No. 2, 1946, pp. 117.

This work is a review of the development of the plant protection service in Argentina from the colonial period (1810) to 1943 when the Department of Agriculture was reorganized. It is divided into four parts: (1) Historical. (2) Plant pathology and the Ministry of Agriculture: reorganization of the laboratory of plant pathology and an account of work undertaken from 1923 to 1932. (3) The organization of the official services for plant protection. (4) Progress made on diseases of plants, including diseases of citrus, fruit trees and horticultural, oil producing, industrial and ornamental plants.

100. ANON. 634.1/8-2.951/952
Bestrijdingsschema voor fruitgewassen. (Pest and disease control methods in the orchard.)
Versl. PLZiektDienst Wageningen 73, 1946, 12 pp.

Pest and disease control in orchards is discussed under two headings: A. Schemes for the necessary spraying; B. Other measures for special purposes. Under A are tabulated the sprayings to be carried out at the various stages of growth for the different kinds of fruit, and stages in the development of the apple are shown by photographs. Under B are notes on the particular measures applicable for red spider, aphids, codling moth, winter moth, apple sawfly, apple blossom weevil, silver leaf and brown rot. Lists are given of apple and pear varieties that are liable to spray injury from bordeaux mixture and from lime-sulphur. A spray calendar is included.

101. WARD, K. M. 634.1/7-2.19
Deficiency disorders in deciduous fruits.
Qd agric. J., 1946, 62: 215-28.

In the Stanthorpe district, where most of Queensland

deciduous fruits are produced, nearly all species of these fruits are affected by deficiency disorders, but it is in apple trees that the troubles are most prevalent. These trees suffer from deficiencies of zinc, copper, and boron, and any combination of these disorders may occur in an individual orchard. Pears are affected by zinc and copper deficiencies, whilst stone fruits mainly show a lack of zinc, and a number of varieties of grapes are benefited by applications of boron. The various disorders (described and illustrated), the deficient elements, the method of control and time of application may be summarized as follows: *Little-leaf*: zinc; zinc-sulphate spray, 20 lb. per 80 gal., applied 2 years in succession, thereafter in alternate years, double strength in first year in severe cases; July-early August. *Wither-tip* or summer dieback: copper; copper sulphate in soil $\frac{1}{2}$ lb. per tree; late winter-early spring or, on non-bearing trees, 4:4:40 bordeaux; November. *Internal cork, corky core, superficial cork or drought spot*: boron; borax soil application $\frac{1}{2}$ to $\frac{3}{4}$ lb. per tree; late winter to early spring. *Measles*: probably boron; borax spray, 4 lb. per 80 gal.; November. *"Hen and chickens"* in grapes: probably boron; borax soil application 2 oz. per vine; late winter to early spring; or borax spray, 4 lb. per 80 gal.; 2 to 3 weeks before blossoming.

102. WALLACE, T. 632.19
Some aspects of mineral deficiencies in farm crops.
From reprint *Agric. Progress, 1945, 20: 20-5.*

This survey of the mineral deficiency problem is given under the headings: A. Important and interesting mineral deficiencies observed in farm crops during the war period. B. Field methods of diagnosing mineral deficiencies. C. Control measures for magnesium, iron, manganese and boron. A table shows the percentage dry matter and p.p.m. dry matter values of healthy and deficient plants of 20 crops, including vegetables, top fruits and small fruits, for calcium, magnesium, potash, phosphate, iron, manganese and boron.

103. IGNATIUS, J. G. W. 632.191
Chlorose door ijzergebrek. (Chlorosis due to iron deficiency.)
Meded. Direct. Tuinb., 1946, pp. 581-2.

In connexion with the study of iron-deficiency chlorosis in plants the author used, as a colorimetric method of determining the iron concentration in solutions, a 0.5% solution of potassium ferrocyanide in distilled water. As standard solutions for the preparation of a colour scale he used ferrisulphate, ferricitrate and ferrichloride. The keeping qualities of these solutions was ensured by adding a few drops of 10% HNO_3 . In his trials he confirmed the conclusion of s'Jacob (*Diss. Utrecht*, 1927) that peas were unsatisfactory but that beans were exceptionally good plants for iron deficiency experiments with culture solutions. It appears impossible to induce chlorosis when ferricitrate is the source of iron. CaCl_2 causes an evident chlorosis at pH 5.5, while chlorotic symptoms appear also when CaSO_4 is used, in both cases with iron sulphate as the source of iron. Using ferricyanide chlorosis was observed with CaSO_4 , K_2SO_4 and MgSO_4 at pH 6.5, 6.0 and 6.5 respectively.

104. CHANDLER, W. H., HOAGLAND, D. R., AND MARTIN, J. C. 634.1/8-2.19: 631.811.9
Little-leaf or rosette of fruit trees. VIII. Zinc and copper deficiency in corral soils.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 15-19, bibl. 2.

These trials in the San Joaquin valley failed to show why trees and vines are unable to obtain all the copper and zinc needed from soils which supply enough for annual plants and lucerne.

105. CHANDLER, W. H., AND APPLEMAN, D. 634.1/8-2.19: 631.811.9
Little-leaf or rosette of fruit trees. IX. Attempt to produce corral injury with constituents of urine.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 25.

Trials with creatine and indican indicated that neither of these can be the cause of the unavailability of zinc or copper to trees in corral soils.

106. HOLBECH, J. A. 634.11-2.19: 546.27
Boron deficiency in apples. Observations at New England Experiment Farm.
Agric. Gaz. N.S.W., 1946, 57: 17-21, 75-80, 132-6, 184-8.

The occurrence of what was known as cork, crinkle cork, confluent pit or crinkle and pig face in apple fruits was formerly one of the chief problems of orchardists in certain districts of New South Wales. It has been found, however, that these disorders are due to a deficiency of boron and can be controlled by applying borax. Investigations carried out to study the effect of applications of borax are described in detail and the results discussed. Recommendations for the control of the disorders based on these results are: *Soil dressings*. These are most effective and convenient and are recommended in preference to spray applications, but young, non-bearing trees should not be treated with borax. The dressings are from $\frac{1}{2}$ lb. to 1 lb. per tree depending on its size, and they should be applied during June, July or August. The borax should be spread evenly on the soil in a ring 2 feet wide starting 2 to 3 feet from the butt of the tree. One dressing should suffice for several years. *Spray applications* may be of use on young trees or when a grower has left it too late to apply a soil dressing. A spray of $2\frac{1}{2}$ lb. borax to 100 gal. water is sufficient. It is most conveniently applied, combined with the usual arsenate of lead against codling moth, at the calyx stage. It is desirable for the borax spray to be applied each year.

107. ROBERTS, R. H. 634.11-2.111
Cold injury of apple blossoms, 1945.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 61-3, bibl. 1.

An unusually early start of growth, a prolonged blossoming period and recurring frosts at Madison, Wis., in the spring of 1945 allowed observations to be made on the frost damage sustained at different stages of development in several apple varieties. Injury to the ovules was the type observed. A marked decrease in hardness was observed with the approach of the full blossom stage.

108. FARRALL, A. W., SHELDON, W. H., AND HANSEN, C. 632.111
Protection of crops from frost damage through the use of radiant energy.
Quart. Bull. Mich. agric. Exp. Stat., 1946, 29: 53-63.

The authors give brief notes on the use against frost of oil-operated smudging, air-circulation methods including the use of a helicopter, spraying with water and fog-production, all of which, in their opinion, have distinct drawbacks. They then describe an infrared, electrically operated radiation device as follows: "The apparatus consists essentially of an aluminium reflector with specially treated surface of proper shape to distribute the energy over a given area, and rod-type chromolox electric heating element so positioned as to focus the radiant energy over the prescribed area. The radiation unit was built up in sections and so positioned over the area to be protected that the prescribed area of 1,600 square feet could be covered. A double line of radiant units was used in order to minimize any inaccuracies in the reflector design or heating element radiation. Note also that on one end of the radiation assembly one of the heating units was omitted in order to give a portion of the area less radiation than the rest so that the effect of various radiation intensities could be more readily observed. The unit was connected to a standard 3-phase 440-volt alternating current line." Effective frost protection was achieved, but costs were excessive. Next, an oil-heated type radiation apparatus was tried. The device was essentially an oil burner with a heater table which operated at low red heat and a series of special type reflectors which directed the radiant heat down against the crop. Tests indicated that it offered "a good possibility of being a practical and economical frost prevention unit". The estimated cost of an agricultural unit of this type is 83 to 125 dollars. The authors note that the tests reported deal exclusively with protection against frosts on typical frosty radiation nights. But much frost injury occurs in spring under conditions of considerable wind, the tissues becoming frozen. Although the devices described have not been tested under such conditions, the authors are of the opinion that radiant heat should afford almost as effective protection under such conditions as during typical frosty radiation nights.

109. LEEFMANS, S. 634/635: 632.13
Ernstige schade aan tuinbouwgewassen door hagelslag. (Severe damage to horticultural plants caused by hail.)
Meded. Direct. Tuinb., 1946, pp. 573-6.

Severe damage by hail to greenhouses and to garden crops in south Holland early in August, 1946, is described. The hailstones are said to have measured 1 to 5 cm. in diameter. Photographs show the damage to a bulb shed, greenhouses, rhubarb, beans and pears.

110. KIENHOLZ, J. R. 634.13-2.181
Performance of a pear orchard with flooded soil.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 7-10, bibl. 5.

Flooding for a mere 2 weeks sufficed to kill a row of apricot trees near Hood River, Oregon. Bartlett pears proved more subject to flooding injury than Anjou, at least following a winter in which winter injury occurred. Continuous

waterlogging for a season killed pears, but complete submergence for 3 months during 3 growing seasons did not kill them, though it affected fruit development. Such treatment resulted in Anjou fruits developing not only cork spot but also internal breakdown similar to that seen in storage. Bartlett fruits softened and coloured earlier than normal, but did not develop hard-end or black-end.

111. HARMON, F. N., AND SNYDER, E. 634.8-2.8
Investigations on the occurrence, transmission, spread and effect of "white" fruit color in the Emperor [*Vitis vinifera*] grape.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 190-4, bibl. 2.

Observations over a 10-year period in Californian vineyards show little change in the number of vines producing white fruit with its lower sugar content. Grafting tests indicate that the white type carries an infectious factor which can be transmitted to the red type, with resultant change to inferior type though without apparent effect on vigour or quantity of fruit carried. The remedy appears to lie in rigid selection and replacement.

112. CHRISTOFF, A. 578.65: 632.8
A differential staining by the aid of Nile blue sulphate. [Bulgarian, English summary.]
J. agric. Exp. Stats. Bulgaria, 1941, 11: 13-15.

Nile blue, found to be a differential stain for dead and living fungal sclerotia, was used also in certain virus tests. On strips of epidermis of tobacco and tomato plants, infected with the severe etch virus, all the cells without chlorophyll were stained red while the amorphous and crystalline virus bodies (intracellular plates) were coloured blue with the dye. A method of staining pure virus preparations is described.

113. MOORE, R. C. 634.11-2.3
Inheritance of fire blight resistance in progenies of crosses between several apple varieties.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 49-57, bibl. 6.

Eighteen hundred and seventy-five 3- and 4-year-old F_1 hybrid apple seedlings obtained from 14 controlled crosses were tested by artificial inoculation with fire blight, *Erwinia amylovora*, and a study was made of the genetic distribution of the populations into resistant and susceptible classes. The most resistant of the progenies were those of Winesap \times Delicious, Winesap \times Jonathan and Arkansas Black \times Delicious.—Blacksburg, Va.

114. MILTHORPE, F. L., AND VINCENT, A. E. 634.2-2.3
Bacterial canker of stone fruit.
Agric. Gaz. N.S.W., 1946, 57: 255-7.

In New South Wales this disease has caused serious losses of apricot, cherry, nectarine, peach and plum trees, infection of young trees being particularly severe. There are two types of limb infection: (1) characterized by the exudation of large amounts of gum (gummiosis cankers), (2) involving a brown moist condition of the bark, first appearing as slightly sunken areas, which, in advanced stages, give off a sour, fermented odour (sour sap cankers). Collapse and death of a limb or tree may not result until mid-summer, when it will occur suddenly. Leaf infection produces water-soaked spots which soon turn brown and drop out. Other foliage symptoms, particularly of plum and peach, are seen as yellow, thin, narrow, often rolled leaves. Blighting of buds and blossoms occurs, the former being very important. Wilting of current terminal growth may result on young sappy shoots growing in a moist atmosphere. Fruit infection of cherry and apricot is shown by depressed spots with dark centres and underlying gum pockets. The disease is attributed to *Pseudomonas cerasi* var. *prunicola*, which infects the trunk or lower limbs during late autumn and winter. Infection takes place through cracks, wounds or

dormant buds. The resultant canker spreads rapidly and grows until early spring. It stops extending when tree growth begins again in spring. Leaf and fruit infection may occur throughout the growing season, but this phase is not common in New South Wales. Tentative control measures recommended are as follows: (1) Pruning should be completed as soon as possible after leaf-fall. Many infections occur through pruning cuts if pruning is carried out in mid-winter. Any necessary pruning of cherry trees should be done before early autumn. (2) Spray with bordeaux mixture (15-15-100) in early May, mid-June and late July. The addition of $\frac{1}{2}$ gal. white oil per 100 gal. spray or a good spreader will increase efficiency. (3) Well-marked varietal resistance has been shown among English and American varieties and attention is being given to the production of trees worked on a framework of a resistant variety.

115. RUDOLPH, B. A. 632.3: 634.13 + 634.51
Attempts to control bacterial blights of pear and walnut with penicillin.
Phytopathology, 1946, 36: 717-25.

In laboratory tests penicillin proved to be bacteriostatic and bactericidal towards the gram-negative organism *Erwinia amylovora* (pear blight), and *Xanthomonas juglandis* (walnut blight). Attempts to control the organism by injecting the host plants with penicillin solution failed completely.

116. MILTHORPE, F. L. 634.2-2.3/4
Dieback and gummiosis of stone fruit trees.
Agric. Gaz. N.S.W., 1946, 57: 319-23.

A key to the diagnosis of the causes of dieback of stone fruit trees is given, together with a brief description of the symptoms and control of these disorders under the headings: bacterial canker; San José scale; tree borers; limb dieback of old trees; *Armillaria* root rot; waterlogging; peach trunk canker; wood-rotting organisms; fruit tree root weevil; crown gall; little leaf or zinc deficiency; and manganese deficiency.

117. WHETZEL, H. H. 632.4: 634.1/8
A synopsis of the genera and species of the *Sclerotiniaceae*, a family of stromatic inoperculate discomycetes.
Mycologia, 1945, 37: 648-714, bibl. 5.

The family *Sclerotiniaceae* Whetzel, fam. nov. includes the brown rot fungi of fruit trees, here put under Honey's genus *Monilinia*, and related fungi.

118. SNEEP, J. 577.17: 632.4
De biochemie van het parasitisme. [Biochemistry of parasitism.] [English summary.]
Tijdschr. PlZiekt., 1946, 52: 125-37, bibl. 22.

Experiments undertaken to study the significance of ergones (hormones) for certain fungi are described. Many ergones have proved to be co-enzymes, prosthetic groups or agonists. It can be assumed that the plant has a complete metabolic system and that the biotrophic parasite has an incomplete one, the latter being completed by ergones derived from the plant. Reciprocally, the metabolic system of the plant is influenced by the pathogen.

119. ANON. 632.42: 634.1/7
Monilia-ziekten van fruit. (Monilia diseases of fruit.)
Versl. PlZiektDienst Wageningen, 88, 1946, 6 pp.

An account is given in popular language of the diseases of fruit trees caused by *Monilia fructigena* and *Monilia cinerea*. The necessity for the usual hygienic measures for reducing infection, the control of insects that injure the fruit, and the destruction of wasps' nests, is emphasized. Winter spraying with 7½% fruit-tree carbolineum is recommended for cherries and plums, and one of the copper-containing preparations as the buds are swelling.

120. BAILEY, J. S., AND SPROSTON, T. 634.73-2.4
Fermate for the control of mummy berry of the cultivated blueberry.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 209-12, bibl. 6.
Trials at Amherst, Mass., in 1945 indicate the distinct possibilities of Fermate for controlling the mummy berry disease of blueberry caused by a fungus thought to belong to the genus *Sclerotinia* or possibly *Monilinia*.
121. CHRISTOFF, A. 634.22-2.4
Contribution to the study of plum red leaf spot disease, *Polystigma rubrum* (Persoon) De Candolle. I. Host relation and susceptibility of plum varieties. [Bulgarian, English summary.]
Yearb. agric. Exp. Stats. Bulgaria, 1943, 1: 63-9, bibl. 10.
Red leaf spot [leaf blotch] of plums is said to be one of the most destructive diseases in Bulgaria, where it has been found on *Prunus cerasifera* Ehrh., *P. domestica* L., *P. insititia* L., *P. salicina* Lindl., and *P. spinosa* L. The varieties of *P. domestica* and *P. insititia* show various degrees of susceptibility, while *P. cerasifera* shows great resistance.
122. WHETZEL, H. H., AND WOLF, F. A. 634.38-2.4
The cup fungus, *Ciboria carunculoides*, pathogenic on mulberry fruits.
Mycologia, 1945, 37: 476-91, bibl. 12.
A study has been made of a fungus attacking the fruits of mulberry, *Morus alba*, and causing the so-called "popcorn disease". The organism is transferred from *Sclerotinia* to *Ciboria* and is assigned the binomial *Ciboria carunculoides* (Sieglar and Jenkins) Whetzel. It has a sclerotial phase and an apothecial phase, but lacks conidia.
123. JAIVENOIS, A. 632.47: 634.1/7
Le plomb des arbres fruitiers (*Stereum purpureum*). (Silver leaf disease of fruit trees).
Courr. hort., 1946, 8: 477-8, 542-3.
The author discusses silver leaf and its control with particular reference to its occurrence on grafted plum trees, and draws the conclusions from his observations that silver leaf, at least in its early stages, is purely a physiological disorder resulting from the "shock" of cutting back and grafting, and that the parasitic form with the necrosis of the wood is consequent on the initial disorder set up.
124. GERRITSEN, J. D. 634.722-2.4
Vragen rondom de bladvalziekte van de roode bes. (Leaf spot of red currants).
Tijdschr. PLZiekt., 1946, 52: 119-20.
Of the red currant varieties cultivated in Holland, Fay's Prolific, Versailles and Laxton No. 1 are very susceptible to leaf spot (*Pseudopeziza ribis*), whereas Deutsche Zure (Prince Albert) and Erstling aus Vierland are more or less resistant. Although experimental evidence is lacking, the author suggests that a combination of both pre-blossom and post-harvest sprays will probably give successful control.
125. LUTTRELL, E. S. 634.848-2.4
Black rot of muscadine grapes.
Phytopathology, 1946, 36: 905-24, bibl. 10.
Black rot, a common and conspicuous disease of muscadine grapes (*Vitis rotundifolia* Michx.), causes spotting of the leaves, a canker or blight of the petioles, tendrils, stems and flower clusters, and a superficial scab or canker of the berries; it has little effect on yield and appears to be of minor importance. The fungus is described as a new form, *Guignardia bidwellii* f. *muscadinii*. There is no evidence that the disease can be controlled by spraying. Control measures other than good cultural practices are not recommended.
126. DE BROUWER, W. M. TH. J. 632.654.2: 634.22 + 634.25
Een aantasting door een mijt, vermoedelijk *Phyllocoptes fockeui* Nal., bij perziken en pruimen onder glas. (Infestation by a mite, probably *Phyllocoptes fockeui* Nal., of peaches and plums under glass.)
Tijdschr. PLZiekt., 1946, 52: 163-5.
In Westland (Holland) an infestation of peaches and plums under glass by a mite, probably *Phyllocoptes fockeui*, was observed for the first time during the summer of 1946. The leaves of infested trees resembled those of trees with silver leaf and were often curled upward at the margins. It is possible that the mite was introduced from the nursery. Sulphur dust and nicotine gave good control.
127. KUENEN, D. J. 632.654.2: 634.1/2
Het winterui van het fruitpunt (*Metatetranychus ulmi* Koch) en zijn bestrijding. (Controlling the fruit tree red spider.)
Tijdschr. PLZiekt., 1946, 52: 69-82, bibl. 9.
The following observations are made on the incidence and control of the fruit tree red spider: (a) Even the most careful spraying will not eliminate all the winter eggs, and a few sprayed eggs will always hatch. There will therefore always be a danger of attack in the summer. (b) Oil + dinitro-orthocresol is more effective than mineral oil alone. (c) The later the spraying is done the better the control. Care should be taken not to spray too late for fear of bud damage or, when oil + d.n.c. is used, of missing the aphids, which hatch about three weeks earlier than the red spider. (d) When d.n.c. sprays without oil are used for a number of years instead of tar-oil, there is the danger of an increase in spider infestation, as more winter-eggs may hatch after such sprays have been applied than in the unsprayed checks.
128. IVANOVA, N. A. 632.753
Steam application for the control of *Pseudococcus comstocki*. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1946, 11: 21-6.
In recent years in the Tashkent province and in certain regions of Kazakstan, U.S.S.R., the mealy bug *Pseudococcus comstocki* has increased considerably in numbers on various crop plants, particularly the mulberry. An account is given of a method of controlling this pest on trees in the open by the application of steam at 80°-85° C. The machine used is described and illustrated by diagrams with dimensions.
129. PASFIELD, G. 634.25-2.753
Control of black peach aphids (*Anuraphis persicae-niger*) by the use of D.D.T.
Agric. Gaz. N.S.W., 1946, 47: 201-4.
Two applications of 0.1% DDT-solvent naphtha-wetting agent spray controlled black peach aphid infestations on plum and nectarine trees in the Young district, New South Wales, in 1945. The time taken for 100% mortality varied from 5 to 10 days from the date of spraying. The spray was made by dissolving 1 lb. of DDT in 5 pints of solvent naphtha and then adding $\frac{1}{4}$ pint of a proprietary wetting agent. This 6 pints of stock emulsion in 100 gal. of water made 0.1% DDT spray. Three applications of nicotine sulphate sprays on other trees were inadequate for controlling the infestations.
130. PETCH, C. E. 634.11-2.76
The round-headed apple tree borer.
Processed Publ. Dep. Agric. Canada, Div. Ent. 57, 1946, pp. 3.
Injury from the round-headed apple tree borer larva, *Saperda candida*, often reaches serious proportions before it is detected, trees up to 10 years of age suffering most. Preventive measures consist in placing cylinders of galvanized

screen cloth of $\frac{1}{8}$ in. or finer mesh around the base of the trunk of young trees or spraying with lead arsenate or cryolite at the rate of $1\frac{1}{2}$ lb. per 40 gal. water. The first spray should be applied about 10 June, with two succeeding applications at 10-12 days' interval. "Worming", the customary method of ridding trees of established borers by means of a knife, etc., has now been superseded. Instead, treatment is recommended of affected tree areas, where castings are present, with a paste of powdered calcium cyanide and raw linseed oil, mixed in the proportion of 2½ oz. cyanide to each oz. oil. A pint of the mixture is sufficient to treat at least 50 borers, the best time for its application being May and early June.

131. BRENY, —. 634.13-2.76
Le bupreste du poirier. (The sinuate pear tree borer.)
Fruit belge, 1946, 14: 141-7.

The morphological characters of the larva and of the adult beetle of the sinuate pear tree borer (*Agilus sinuatus* Ol.), its biology and damage caused are described. The adults appear in June and July and feed on the foliage. Their eggs are laid in fissures of the bark and the young larvae penetrate the bark and produce a system of sinuous, spiral galleries. Not only is mechanical damage caused to the trunks by the borings, but the injuries may become cankerous owing to the entrance through the wounds of wood-destroying fungi. Recommendations for control are the application of an arsenical spray to leaves, branches and trunks in spring. It is suggested that DDT might also be efficacious.

132. BATRA, H. N., AND RENJHEN, P. L. 634.25-2.76
Some observations on the bionomics and control of peach shoot borer in North-West Frontier Province.
Ind. Fmg., 1946, 7: 127-8.

The life history and the nature of the damage caused by the buprestid borer, *Sphenoptera laferlei*, are described. The apricot is attacked much less than peach and plum. The pest is kept under check at Tarnab by cutting off the attacked branches and burning them. Diesel oil emulsion has been used as an effective ovicide. Good drainage is necessary, and the trees should be kept in good health by judicious manuring.

133. WALLACE, C. R. 635.1/7: 632.76
The black beetle pest.
Agric. Gaz. N.S.W., 1946, 57: 121-4, 144.

In coastal New South Wales the black scarab beetle (*Heteronychia sanctae-helenae*) is well known for its damage to vegetable crops, lawns, florists' crops and certain fruits. The life history and feeding habits of the beetle are described. Direct control by means of benzene hexachloride and DDT is in the experimental stage and farmers are advised to combat the pest by certain modifications of farm practice described.

134. BIRD, R. D. (ALLEN, W. R.). 634.72-2.77
Control of the currant fruitfly on the Canadian prairies.
Processed Publ. Dep. Agric. Canada, Div. Ent. 46, 1946, pp. 3.

The currant fruitfly, *Epochra canadensis* Loew., is the chief limiting factor in the successful production of currants and gooseberries in the Prairie provinces of Canada. On the basis of investigations carried out by W. R. Allen, of the Brandon Laboratory, in co-operation with the Morden Experimental Farm, spraying the bushes with poisoned sweet liquids is recommended as the safest control measure. The following formula has given good results: Cryolite, 4 lb., molasses, 13 qt., water, 80 gal. Applications should be made just after bloom and repeated 2-3 times at weekly intervals, or oftener if rain washes the spray off. DDT showed promise but it is not at present recommended in view of its possibly toxic residue.

135. CHANDLER, S. C. 632.782: 634.11
Codling moth control. A study of growers' practices.

Bull. Ill. agric. Exp. Stat. 519, 1946, pp. 294-332.

In the southern apple-growing districts of Illinois codling moth control is a problem of the utmost importance, on which failure or success depend. It seemed desirable to make a study of growers' practices and of their relation to the degree of control achieved. Thirteen orchards were selected in the three-brooded area of southern Illinois and observations of the control measures adopted by their owners were carried out during the seasons 1942-1944. From this illustrated, well-documented report the conclusion emerges that such practices as method of spraying, choice of insecticide, etc., do not determine the degree of control obtained to the same extent as do the following essential factors: "1. Reduction of insect numbers to a low level by the use of thoro sanitary measures. 2. Thoro spraying of trees that have been well opened up to let the spray material penetrate into the interior. 3. Use of enough spray material per tree to insure coverage, but avoiding putting on so much that fruit will not meet the tolerance test. 4. The efficient use of the spray material." As the best-managed orchards show, the key to success lies in cutting down the first-brood numbers of the pest so that little spraying is needed for the control of the second and third broods. This goal, of course, cannot be reached in one season. After the advent of DDT for general use, a note on 1945 and 1946 tests informs us, the conclusions reached earlier still remain true. The superiority of DDT as an insecticide cannot compensate for poor spraying or other poor practices. In 1946 the observation was made that DDT favours not only red spider but also the red-banded leaf roller, which pest became a more serious problem in some orchards than that of the codling moth. The heavier the application of DDT, the greater was the infestation with red-banded leaf roller.

136. CALDWELL, N. E. H. 632.78
D.D.T. and codling moth control.
Qd agric. J., 1946, 63: 86.

Experiments indicate that, after a calyx spray of lead arsenate, cover sprays containing 0.1% DDT will control codling moth on apples at least as well as, if not better than, insecticides such as lead arsenate, white oil, and white oil-nicotine sulphate. It was found, however, that woolly aphids and mites increased rapidly on all trees receiving DDT cover sprays and towards the end of the season they had reached serious proportions. Presumably DDT reduces the efficiency of the various parasites and predators which normally keep these pests in check. Growers intending to try DDT should be prepared for a sharp increase in woolly aphids and mites, for which subsidiary control measures may be necessary.

137. BERNON, G. 634.8-2.78
Lutte contre l'eudémis. (Controlling the vine moth.)
Prog. agric. vitic., 1946, 126: 285-90.

A satisfactory control of the vine leaf moth [*Polychrosis botrana*] by DDT is reported. The difference between treated and untreated pests was greatest when the vines were thickest and the bunches most compact.

138. ANON. 632.78: 634.72
De bessenspruitvreter. (The currant fruit maggot or shoot borer.)

Versl. PZiektDienst Wageningen 1, 1946, 6 pp.

Descriptions are given of the life history, the damage caused by, and distribution of the currant shoot borer *Incurvaria capitella* Fabr. [= *Lampronia capitella* Cl.]. Spraying with 7½% fruit-tree carbolineum in the second half of January is recommended.

139. ANON. 633.88.11.871: 632.793
The leaf-blister sawfly (*Phylactophaga eucalypti*).
Agric. Gaz. N.S.W., 1946, 57: 198-9.
The leaf-blister sawfly attacks various species of eucalyptus including the red-flowering gum (*E. ficifolia*) and the blue gum (*E. globulus*), and the brush box (*Tristania conferta*), used as a shade and ornamental tree, may be seriously injured. Where the infestation is not severe and the trees are small and limited in number, hand-picking and destruction of the leaves may be undertaken. Control of the larvae in the leaves may be obtained by spraying with nicotine sulphate and oil solution diluted in the following proportions: nicotine sulphate 1 fluid oz., white oil emulsion 8 fluid oz., water 4 gal. A second application may be necessary 2 to 3 weeks after the first.
140. AHLBERG, O. 634.22-2.793
Plommonstekeln och dess bekämpning. (The plum sawfly and its control.)
Flygbl. Växtskyddsanst. Stockh. 77, 1945, pp. 4.
The plum sawfly, *Hoplocampa minuta*, is undoubtedly one of the most serious plum pests in southern and central Sweden. For its control the application of quassia sprays is recommended, the preparation of which is described. At the time of publication the Swedish Plant Protection Station, Stockholm, had not yet been able to carry out trials with DDT.
141. ANON. 632.796
White ants or termites (*Termitidae*).
Agric. Gaz. N.S.W., 1946, 57: 195-7.
White ants are not only very destructive to woodwork but may also attack growing trees, grape vines, shrubs, and even potatoes, tomatoes, tree dahlias and roses. When clearing land for orchards or vineyards great care should be taken to remove all stumps and roots from the ground and to destroy any white ant nests in the vicinity. When trees become infested, cut out the damaged wood if possible. When the roots are attacked, use paradichlorobenzene or some other fumigant. To apply the paradichlorobenzene dig a circular trench 3 to 4 inches deep at a distance of 6 inches from the trunk of the tree and scatter 2 oz. of the fumigant on the bottom of this, afterwards filling in with soil. When grape vines are infested, an auger hole may be bored about 12 inches or less above the ground into the pith in the centre of the main stem. About $\frac{1}{4}$ oz. Paris green is then blown into the opening by means of a small hand blower, the opening afterwards being filled with grafting wax.
142. WATSON, J. R. 632.693.2
"Salamanders" and "gophers".
Pr. Bull. Fla agric. Exp. Stat. 609, 1945, pp. 4.
These two burrowing, squirrel-like animals do much damage in some parts of Florida, especially to pecan trees, on the roots of which they feed. The "salamander" or ground squirrel is controlled by trapping, a laborious method described in detail, while the "gopher" or burrowing turtle is poisoned with pieces of corn cobs soaked in carbon bisulphide. After rolling the bait into the burrow its mouth is filled with soil.
143. BROWN, C. A., AND CARTER, W. H. 632.5
Weed investigations.
Bull. La agric. Exp. Stat. 402, 1946, pp. 24.
The investigations were chiefly devoted to alligator weed, *Alternanthera philoxeroides*, which is normally an inhabitant of waterways, but has infested crop lands in South Louisiana and thereby become a very serious agricultural pest. Spraying with 2,4-D gave very promising results, and it is hoped that the weed may be brought under control. The setting up of a weed project at Louisiana State University is advocated.
144. RAUCOURT, M. 632.951 + 632.952
Revue de phytopharmacie (VIII^e Série). (Insecticides and fungicides.)
Ann. agron. Paris, 1946, 15: 379-433, bibl. 176.
This is a continuation of a series of papers on the chemistry of insecticides and fungicides (see *H.A.*, 15: 1633). The present article is a review of the work that has been done on (1) the copper salts and their substitutes, (2) seed disinfection and the organic mercurial compounds, (3) the fluorine insecticides, (4) the organic insecticides from plants, (5) the synthetic organic insecticides, (6) the toxicology of agricultural antiparasitic preparations.
145. PICKETT, W. F., AND BATES, J. C. 634.11: 581.45: 632.95
The influence of various fertilizers and foliage sprays on the internal structure of apple leaves.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 20-4, bibl. 3.
The ratio of the internal exposed surface to the external surface of apple leaves of different varieties from different locations and submitted to different foliage spray treatments was determined and found to differ with such different treatments as spraying with Gesarol, lead arsenate, nitrogenous fertilizers, and wettable sulphur lead arsenate, with and without the addition of ammonium sulphate as a fertilizer. The differences are detailed.
146. PICKETT, W. F., AND BIRKELAND, C. J. 634.11-2.95: 581.144
The influence of some spray materials on the internal structure and chlorophyll content of apple leaves.
Bull. Kans. agric. Exp. Stat. 53, 1942, pp. 54, bibl. 59.
About three-quarters of the bulletin are devoted to a discussion of the internal structure of field- and greenhouse-grown apple leaves, especially of the mathematical relationships between external and internal surfaces and between different tissues to one another. The varieties used for the purpose were York, Wealthy and Jonathan. All spray materials tested were found to shock or check normal cell development with each application throughout the growing season, but the palisade tissue was not so much dwarfed by mild sprays as it was by stronger materials. The chlorophyll content of field-grown leaves was not reduced by spraying in any of the three varieties. These are a few of the conclusions reached by the authors as a result of their measurements, calculations and experiments.
147. MOON, H. H., AND HARLEY, C. P. 634.11-2.951
Effect of DDT spray on apple leaf efficiency.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 11-14, bibl. 2.
Under the conditions of this experiment at Beltsville, Md, leaf efficiency was not impaired by DDT residues on apple foliage. 25% fine-particle DDT in 300-mesh clay was suspended in water and sprayed on fruits and foliage of selected branches of six different apple varieties. The concentration was 1.5 lb. DDT in 100 gal. water. Controls were sprayed with the clay suspension without the DDT. Relative leaf efficiency was determined by measuring the circumference enlargement rate of apples on ringed branches having 200 and 300 square centimetres of leaf area per fruit.
148. KLEIBURG, P. L. 632.951
Gevaeren van dinitro-orthoresol. (The dangers of dinitro-orthoresol.)
Meded. Direct. Tuinb., 1946, p. 577.
The poisonous nature of dinitro-orthoresol is pointed out. Fatal results to employees in factories, where it is prepared, are mentioned.

149. MCCALLAN, S. E. A. 632.3/4: 631.16

Outstanding diseases of agricultural crops and uses of fungicides in the United States.

Contr. Boyce Thompson Inst., 1946, 14: 105-15.

A tentative method is presented for determining the importance of disease losses on an overall or national basis. An index is obtained from the product of the logarithm of the estimated annual per cent. loss and the logarithm of the farm value expressed in units of \$100,000. A table is given of the 50 leading agricultural crops of the United States together with the farm value, acreage and farm value per acre, as well as the five leading states. The 36 outstanding diseases obtained by the above procedure are recorded, together with the average annual, 10-year range in fluctuation and present major control measures. Tables are also presented showing the estimated annual consumption of fungicides by chemicals and by crops and diseases. [From author's summary.]

150. HEIBERG, B. C., AND RAMSEY, G. B.

632.952: 634/635

Fungistatic action of diphenyl on some fruit and vegetable pathogens.

Phytopathology, 1946, 36: 887-91.

In 52 fruit and vegetable pathogens grown on plate culture in the presence of vapour from diphenyl ($C_6H_5 \cdot C_6H_5$) crystals there was wide variation in degree of tolerance to this chemical. The organisms best controlled under those conditions included species of *Aspergillus*, *Botrytis*, *Monilinia* [*Sclerotinia fructicola*], *Rhizoctonia*, *Sclerotinia* and *Septoria*. The use of diphenyl-impregnated wraps, pads, or packages is suggested for controlling diseases of some commodities, but the retention of the odour of diphenyl by many products will make the use of this chemical impracticable in many cases.

151. WELLMAN, R. H., AND MCCALLAN, S. E. A.

632.952

Glyoxalidine derivatives as foliage fungicides. I. Laboratory studies.

Contr. Boyce Thompson Inst., 1946, 14: 151-60, bibl. 16.

Some of the glyoxalidine derivatives gave promise as foliage fungicides since they combine high fungistatic action with low phytotoxicity. In greenhouse tests these materials were phytotoxic to tomatoes at concentrations which would not control late blight and were moderately effective against snapdragon rust without phytotoxicity.

152. THURSTON, H. W., AND OTHERS.

632.952

Glyoxalidine derivatives as foliage fungicides. II. Field studies.

Contr. Boyce Thompson Inst., 1946, 14: 161-71.

Three glyoxalidine derivatives investigated in the laboratory (see above, No. 151) have been tested in the field during several years for the control of black spot of rose, apple scab and rust, late blight of potato, and cherry leaf spot. All three gave promising results against apple scab; one of them 2-Heptadecylglyoxalidine at 1 lb. per 100 gal. produced consistently better looking foliage with greater area per fruit spur than standard lime-sulphur and had a marked residual effect on control of scab on foliage. On sour cherries, var. Montmorency, it proved to be the most effective compound tested for the control of leaf spot defoliation, there was little or no leaf injury and no dwarfing of fruit. On roses the same compound at 3 lb. per 100 gal. gave black spot control equivalent to bordeaux mixture with wetting agent and with less conspicuous deposit. The glyoxalidine derivatives caused foliage injury of potato and did not control late blight.

153. STEWART, W. D., AND STANDEN, J. H.

632.952

Polymeric organic polysulphides as fungicides and spray adjuvants.

Contr. Boyce Thompson Inst., 1946, 14: 203-20, bibl. 14.

Polymeric organic polysulphides of high molecular weight

can be made as stable, finely-divided, aqueous dispersions with a range in particle size of 1 to 4 microns. These are specially suitable for use as spray materials. When sprayed on plants these latices dehydrate to form rubbery, non-phytotoxic films, insoluble in water and oil, of unusual tenacity and resistance to weathering. On admixing with other spray materials tenacity and resistance to weathering are imparted to the spray deposit. The polymers were evaluated as fungicides by standard laboratory procedures against *Sclerotinia fructicola* and *Alternaria solani*. Polymeric organic polysulphides are fungicidal. Toxicity to fungi increases with increase in sulphur content of polymer. Activity is associated with the solid or polymer phase of the latices; the aqueous phase is almost non-toxic. Polyethylene pentasulphides are considered the most possible for commercial use. Latices of these polymers were tested in 1945 in the field using modern high pressure spray equipment. The polymers were more effective at 2 lb. per 100 gal. as a protective spray for the control of apple scab than micronized sulphur at 10 lb. per 100 gal. under conditions of high and frequent rainfall. Latices of this polymer when applied in mixed sprays enhanced the activity of toxicants. Build-up of spray deposits was rapid even with high and frequent rainfall. Physical compatibility with standard fungicides and insecticides, oil included, was excellent. [Authors' summary.]

154. POWELL, D.

632.952

Copper 8-quinolinolate, a promising fungicide.

Phytopathology, 1946, 36: 572-3.

In glass-slide fungicide tests the compound 8-quinolinol and its copper derivative were both highly toxic to *Sclerotinia fructicola*. In field trials copper 8-quinolinolate showed considerable promise as a protectant for apple scab and blotch.

155. KIENHOLZ, J. R.

634.13-2.952

Reduction in yield of Anjou pear caused by wettable-sulphur spray.

Phytopathology, 1946, 36: 777-9.

Spraying with wettable sulphur for the control of pear scab has caused reduction in the yield of Anjou pears in the Hood River Valley, Oregon. It has also given poor scab control and caused fruit russet. The appearance of fruit, yield, and foliage colour have all been superior where such substitutes as copper phosphate or Fermate have been used.

156. ILJINSKAYA, M. I.

632.951

The mechanism of insecticidal action and the permeability of the cuticle of insects.

C.R. Acad. Sci. U.R.S.S., 1946, 51: 557-9.

Test insects used in experiments, the results of which are tabulated, were the chrysanthemum aphid, *Macrosiphoniella sanborni* Gill. and the apple aphid, *Aphis pomi* Dege. The studies show that organic thiocyanates are able to penetrate quickly through protective, semipermeable membranes and are highly toxic to insects. Alkaloids easily penetrate the cell in the form of molecules of undissociated alkali, while the cellular membrane is but little permeable, if at all, to the alkaloid cation. Anabasin-base is a powerful protoplasmic poison which, in the form of a free alkaloid base, but very slightly dissociated, penetrates easily the cuticle of insects as shown by its highly toxic effect on the apple-tree aphid. Anabasin sulphate is strongly dissociated electrolytically and contains the alkaloid chiefly in the form of free cations to which the insect cuticle is but little permeable; it is thus only weakly toxic to insects, particularly sucking insects such as aphids.

157. SKVORCOV, A. A.

632.951: 632.6/7

On the permeability of insect integuments for contact insecticides. [Russian.]

Adv. mod. Biol., 1946, 21: 249-55, bibl. 24.

A review of the literature on the structure of insect integuments with reference to their permeability to insecticides. These studies are the theoretical basis for toxicology and

disinfection in the choice and application of insecticides. Formerly the work was carried out on empirical lines but now it has a scientific basis.

158. PRILL, E. A., HARTZELL, A., AND ARTHUR, J. M. 632.951

Insecticidal thio ethers derived from safrole, isosafrole, and other aryl olefins.

Contr. Boyce Thompson Inst., 1946, 14: 127-50, bibl. 19.

Most of the tests were carried out on house flies, but preliminary tests of a number of the various thio ethers on agricultural insects and mites such as bean aphids, pear aphids, red spider mites, and a thrips species, showed these compounds, including the thio ethers which did not contain the methylenedioxyphenyl residue and which had been found ineffective toward house flies, to be toxic to the agricultural insects and mites tested.

159. TILMANS, E. 632.951

Les insecticides organiques chlorés. (Organic chloro-compounds as insecticides.)

Bull. agric. Congo belge, 1945, 36: 79-99.

The chemical properties and method of preparing DDT and "Gammexane" are described and the published literature relating to trials of these insecticides reviewed to show their economic value in agriculture, public health and the domestic spheres. Mention is also made of some laboratory experiments at Gembloux to test the efficiency of 10% DDT against Colorado beetle, cockroaches, stored grain pests, and as a soil disinfectant.

160. VAYSSIÈRE, P. 632.951

Le contrôle biologique des insecticides. (The biological action of insecticides.)

Cours Conf. Perf. tech., Paris, 1942, Vol. 841, pp. 10.

By "contrôle biologique" the author does not mean "biological control" in the sense the term is now being used in the English-speaking world, but he discusses methods of toxicity tests to determine the efficacy of certain insecticides on certain insects.

161. LEWIS, R. W., AND HAMNER, C. L. 632.954

The effect of 2,4-D on some microorganisms.

Quart. Bull. Mich. agric. Exp. Stat., 1946, 29: 112-4, bibl. 3.

Tests indicate that 2,4-dichlorophenoxyacetic acid at the concentrations and rates normally used for weed killing will have no important effect on soil micro-organisms or plant pathogens present in the soil.

162. SWARTENBROEKX, J. M. L. 632.95: 634.1/6

Motor-besproeieters voor boomgaarden. (Motor sprayers for orchards.)

Cult. Hand., 1946, 12: 14-9.

An illustrated account of various types of motor spraying machines and their parts for use in orchard spraying, with a brief reference to atomizers.

163. CHRISTOFF, A. 632.95: 634/635

The possibility of protecting orchard sprayers and other machines from the corrosive action of the solutions used in the control of diseases in horticulture. [Bulgarian, English summary.]

Yearb. agric. Exp. Stats. Bulgaria, 1943, 1: 71-86, bibl. 11.

The author finds that the best protective action was obtained by bee's wax, paraffin wax (55-57° C.), asphalt, or a mixture of equal parts asphalt and paraffin wax. The resin varnishes (pine resin, shellac and coppallac) gave protection against lime-sulphur and were satisfactory against corrosive sublimate. Very good results were obtained with 10% celluloid solution in acetone, but it is not recommended because of its unsatisfactory adhesiveness in some cases; 20% asphalt in xylol has the same disadvantage.

164. HEWLETT, P. S. 632.951

The design and performance of an atomizing nozzle for use with a spraying tower for testing liquid insecticides.

Ann. appl. Biol., 1946, 33: 303-6.

A nozzle, P.I.L. No. AN2, has been designed for, and used successfully in, the biological assay of insecticides in a heavy oil solution. It is easier to adjust and gave a standard deviation of deposit one-seventh of that given by the nozzle described by Potter (see *H.A.*, 11: 776). A footnote states that certain improvements have been successfully incorporated in another nozzle, P.I.L. No. AN3.

165. PRILL, E. A., AND SYNERHOLM, M. E. 632.951: 632.77

Report on some miscellaneous methylenedioxyphenyl compounds tested for synergism with pyrethrum in fly sprays.

Contr. Boyce Thompson Inst., 1946, 14: 221-7.

A report is made of the toxicities to house flies of 69 organic compounds of various types, all containing the methylenedioxyphenyl group in their structures, when tested in solution with a low concentration of added pyrethrins. The report covers those compounds containing this group which have been found to be relatively inactive or only moderately active. The presence of a methylenedioxyphenyl group in the structure of a compound is not a sufficient condition for insecticidal activity or for synergistic activity with pyrethrum. [From authors' summary.]

166. BRYDEN, J. D., AND HALL, E. G. 634.11-2.951

Removal of arsenical residues from apples. Experiments at Bathurst Experimental Farm.

Agric. Gaz. N.S.W., 1946, 57: 189-91, 200, 244-8, 306-9.

It was found that washing with a warm 1% solution of hydrochloric acid effectively reduced normal leaf arsenate spray residues to below the prescribed tolerance of 1/100 grain of arsenic (as As_2O_3) and 3/100 grain of lead (as Pb) per pound of fruit. Washing in an 8% solution of sodium silicate was useful, but was only effective when followed by an acid spray. Increasing the concentration of acid from 1 to 1½% did not significantly improve the removal of residues, but did considerably increase acid wash injury to the fruit. The removal of residues is considerably improved by heating the washing solution, but the storage experiments have shown clearly that, to avoid excessive injury to the fruit, the temperature of the solution should not be higher than 90° F. The addition of white oil to lead arsenate sprays increases the amount of residues on the fruit at picking and makes for great difficulty in reducing the residues to below the tolerance values. The important points to be observed in treating apples for the removal of lead arsenate spray residues are: (1) The fruit should be treated immediately after harvesting. (2) The fruit should be washed in a 1% solution of hydrochloric acid maintained at a temperature of 80-90° F. (3) After washing the fruit must be very thoroughly rinsed with clean water to avoid injury. (4) Clean receptacles, clear acid solution and plenty of fresh water for rinsing should always be used. [From authors' summary.]

167. ALLMAN, S. L. 632.728

Benzene hexachloride in grasshopper baits.

Agric. Gaz. N.S.W., 1946, 57: 171-2.

The wingless grasshopper (*Paulacridium vittatum*) and the Australian plague locust (*Chortiocetes termifera*) have recently caused damage to crops in certain districts of New South Wales. Results of baiting tests indicate that benzene hexachloride ("666")-bran baits were readily eaten by both species, that it would successfully control mature wingless grasshoppers, and would incapacitate a large proportion of a swarm of the plague locust within an hour of feeding.

168. TOKIN, B. P. 632.954
The probable function of phytocides in nature.
[Russian.]

Priroda (Nature), 1946, No. 4, pp. 29-38.

Some 150 species of the higher plants, also bacteria and fungi, have been found to secrete volatile substances which are toxic to many bacteria, fungi and protozoa. Those substances, which are present in the bulbs of onions and the cloves of garlic, are very powerful, and are able to destroy the organisms of several virulent diseases. Little is known of their chemical composition except that they are not simply the volatile oils—even though some of these have antiseptic properties. They have not been isolated. The author discusses not only the obvious usefulness of these volatile plant products, but devotes some space to a discussion of their place in the general scheme of nature.

169. LOW, T. R., AND BURNS, J. G. 632.951:615.779.1

Pyrethrum cultivation in Kumaun (United Provinces).

Ind. Fmg., 1946, 7: 63-5.

The work described, carried out purely as a wartime measure, showed that pyrethrum can be grown under certain conditions in Kumaun. In the opinion of the writers, however, pyrethrum could never in normal times become profitable as a field crop to the hill cultivators.

170. İPEKÖĞÜLÜ, F., AND AKSU, S. 632.951:615.779.1
Yerli pire otu üzerinde araştırmalar. [*Pyrethrum growing in Turkey.*] [English summary.]
Inhisalar Tütün Inst. Rap., Istanbul, 1943, 3: 1: 36-49, bibl. 11.

Pyrethrum trials are being carried out at the Turkish Tobacco Institute. From the results of the trials and from observations made in other parts of the country it is concluded that pyrethrum of good quality and yield can be grown easily and cheaply in Turkey. The flowers grown at the institute contain least Pyrethrin I in the blossom stage; the amount reaches a maximum when the flowers are fully open, and diminishes as the flowers pass their full growth period. The amount of Pyrethrin II is high in the blossoming stage and diminishes as the flowers reach their full growth and pass this stage. The total efficiency is at a

maximum in the full growth period, for the changes in Pyrethrin II have no influence on the total efficiency.

171. OŒICE DU PYRÉTHRE. 632.951:615.779.1
Le pyrèthre. Conseils aux planteurs. (*Pyrethrum. Advice to planters.*)

Bull. agric. Congo belge, 1945, 36: 39-55.

Advice on nursery and planting methods, soil management (including sub-soiling), spacing, harvesting and drying the pyrethrum crop in the Congo. The information is intended for those with little previous acquaintance with the crop, but the section dealing with drying equipment is treated in more detail.

172. RUSSELL, G. A., AND LITTLE, V. A. 632.951:631.8
Response of rotenone-bearing devil's shoestring, *Tephrosia virginiana* (L.) Pers., to fertilizer applications.

J. Amer. Soc. Agron., 1946, 38: 646-50.

The experiments described were carried out in Texas on the native legume commonly known as devil's shoestring, a possible source of a rotenone insecticide. Both nitrogen and potash, when applied singly or with other fertilizers, increased the yield of roots, and potash improved the quality. Phosphate, however, either alone or in combination with other fertilizers, was of no value, and the data indicate that it was actually detrimental to root quality.

173. MERRILL, T. A. 634.22-2.75

a The effect of potato leaf hopper on the size, color and condition of plum foliage.

Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 91-2.

Considerable damage noted.

b ROSS, W. A., AND GARLICK, W. G. 634.75-2.6/7
Common strawberry insects in Ontario and their control.

Processed Publ. Dep. Agric. Canada, Div. Ent. 44, 1946, pp. 5.

Control measures against 8 strawberry pests.

c SITES, J. W. 632.951
A simple method for the preparation of 666.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 213-4.

VEGETABLE, RUBBER AND OTHER CROPS.

174. COKE, J. 633.5/8(71)
Special crops [in Canada].
From reprint *Agric. Inst. Rev. Canada*, 1946, 1: 335-40.

For the article on fruits and vegetables published in the same number of the journal, see *H.A.*, 17: 32. The present paper deals with tobacco, sugar beets, hybrid corn, sunflowers, soybeans, rape seed, honey and maple products. *Sunflower*: Prior to 1940 not a sunflower was grown in Canada for the edible vegetable oil it could supply, whereas the seed yield in 1946 is estimated at about 22,400,000 lb. This rapid development is largely due to the release of the variety Advance, a hybrid of Sunrise, which in its turn was bred from an old Russian variety. *Soybeans*: In the last 10 years the soybean acreage has more than trebled, but imports are still being made to satisfy the demand. 95% of the crop is grown in Ontario. *Rape seed* oil was not produced in Canada until 1943. The crop is now grown in Saskatchewan and Manitoba, both for industrial purposes and as an edible oil. It is estimated that 1,200,000 lb. rape seed oil could be used annually in foodstuffs. *Maple products*: The introduction of the Maple Products Industry Act in 1945 ensures a general standard of improved quality as a consequence of which consumption is expected to increase. In the period 1940-1944 production by about 40,000 farmers averaged 27 million lb. Potential production is estimated at 80

million lb. Harvesting and marketing methods are briefly described, and it is noted that Canada is the only country exporting maple syrup or maple sugar.

175. SWEET, R. D. 635.1/7:631.411.4
Cultivation studies of certain vegetables grown on peat soils.
Bull. Cornell agric. Exp. Stat. 795, 1943, pp. 44, bibl. 14.

The experiments were carried out from 1937 to 1939 on grower-co-operator farms in the Genesee-Orleans peat area, where vegetable culture is a comparatively recent enterprise. On five distinct types of peat the following crops were grown: onions, carrots (bunching and cannerly type), lettuce (White Boston and Iceberg type) and celery, and two treatments were given: shallow cultivation (less than $\frac{1}{2}$ in.), and deep cultivation (2 $\frac{1}{2}$ -3 in.). The influence of depth of cultivation on soil moisture, temperature, nitrates, marketable crop yields, and especially on root distribution, is reported in detail, the last point being illustrated by a number of photos. As the result of these studies the conclusion emerges that on self-mulching, peat soils deep cultivation is detrimental. Weed control, which is of primary importance, should be accomplished with as shallow cultivation as possible.

176. ARONOV, V. 551.566.3: 635.1/7
Growing vegetables on the Kolyma river. [Russian.]
Soc. Sel'sk. Hoz. (Socialist Agriculture), 1946,
No. 6, pp. 52-5.

The basin of the Kolyma river, so rich in mineral resources, boasts of an ever-increasing industrial population, whose needs in fresh vegetables had to be met. Although this region in the extreme N.E. corner of the U.S.S.R. has the coldest climate in the world, this has been successfully accomplished. Cabbages, cauliflowers, turnips, swedes, radishes, carrots, table beet, lettuce, fennel, spring onions, green peas, potatoes, and even vegetable marrows and tomatoes were grown successfully in the open, while many others, such as melons, water-melons and cucumbers, gave excellent yields in cold frames and hot-houses. A short description of the agricultural technique used in this arctic region is provided in the paper.

177. ARKIN, I. V., MARKEEV, F. A., AND SNTKO, E. Z. 635.1/7: 631.34
Machines for vegetable growing. [Russian.]
Ogiz, Sel'hozgiz, Moscow, 1939, 132 pp., 76 figs.
[Received October, 1946.]

This is a critical account of machines used in vegetable growing, for seed sowing, transplanting, cultivation between rows, bed and ridge cultivation, harvesting root crops, and for cleaning and sorting seeds.

178. POST, K., AND SEELY, J. G. 631.544: 631.67
Automatic watering of greenhouse crops.
Bull. Cornell agric. Exp. Stat. 793, 1943, pp. 26,
bibl. 19.

The automatic watering of greenhouse crops has several advantages over surface watering, foremost among them the reduction in labour and the more uniform supply of water. Other favourable aspects are an economy in fertilizers, since leaching does not occur, and the prevention of certain diseases, since the foliage is kept dry. In these tests the wick system and the injection system were used for sub-irrigating the soil, and the most satisfactory methods developed for the automatic watering of potted plants, seed flats, window boxes and plants growing in benches of soil are described and illustrated. In the first system, which is the simpler, water is conducted to the soil from a container below by a wick, preferably of glass cloth rolled into the form of a $\frac{1}{2}$ -in. round wick. The water injection method, through an eaves trough, on V-bottom benches levelled with gravel, is diagrammatically explained. A soil tensiometer is required to determine time and amount of watering. By connecting the tensiometer to a vacuum gauge and by certain other devices the system can be made to work automatically. Experimental results are given for the subirrigation of chrysanthemums, snapdragons, carnations and roses, which demonstrate the efficiency of the methods applied in the absence of any detrimental effects on the crop.

179. FLEMION, F., AND UHLMANN, G. 635.1/7: 588.93: 631.531
Further studies of embryoless seeds in the *Umbelliferae*.
Contr. Boyce Thompson Inst., 1946, 14: 283-93,
bibl. 6.

Seeds of many umbelliferous plants being notoriously poor germinators, a survey was made of the prevalence of embryoless seeds in anise, caraway, carrot, celery, coriander, dill, fennel, parsley and parsnip. It was found that seeds without embryos but with apparently normal endosperm are common and may reach a frequency of 50% or more.

180. KOZLOVSKIĬ, A. I. 635.34/35: 631.531
Seedling killing of *Cruciferae* seed stock plants, its causes and possible elimination. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1946,
11: 36-40, bibl. 3.

In the production of seed from root crops, turnips particularly,

there is often great loss during the summer among the plants grown from the roots planted out to produce seeds. It starts soon after the roots are planted and continues throughout the summer until flowering time and the ripening of the seed, in the latter case with premature ripening. The disease is caused by a bacterial rot of the "mother" roots in the soil, attributed to *Bacterium carotovorum*, with the consequent wilting of the parts above ground. The summer loss bears some relation to the losses during the storage of the mother roots, the greater the loss in store the earlier and more severe is the summer loss. The latter depends also on unfavourable agricultural conditions, such as absence of rotation, late planting, late cultivation of the soil, etc. It is also influenced by the amount of shoot growth from the roots before they are planted out, the greater the growth the more liable being the plants to summer rot. Care in maintaining optimum conditions during storage is recommended.

181. BELJENKOVA, A. F., KORJAKINA, V. F., AND SMETANNIKOVA, A. I. 631.531: 635.1/7
How seed from some biennial vegetable crops can be produced in one year. [Russian.]
Sovetsk. Bot., 1945, 13: 5: 29-35.

Varieties of table beet, of swede and of cabbage, were used in an experiment in which the sprouting seeds and the seedlings were vernalized and the young plants when 20 to 30 days old were grown under conditions of curtailed daylight in order to induce bolting in the first season. The beet and swede varieties could be made to yield seed in the first season by subjecting the sprouting seeds and seedlings to low temperature. Cabbage did not always prove amenable to such treatment. Plants 20 to 30 days old, when grown in curtailed daylight, were much improved in development and colour.

182. BARTON, L. V., AND GARMAN, H. R. 631.531.16
Effect of age and storage conditions of seeds on the yields of certain plants.
Contr. Boyce Thompson Inst., 1946, 14: 243-55,
bibl. 12.

The investigation was to determine whether the age and storage conditions of the seeds of aster, verberna, pepper, tomato and lettuce would have an effect on the yield of plants grown from such seeds. Old and fresh seeds of verberna and pepper produced plants of similar quality. Lettuce seed stored for 13 years produced heavier heads than fresh seeds. Tomato seeds, stored 13 years at room temperature, with a germination capacity of only 6%, produced inferior plants, but the plants from seeds stored 18 years under dry conditions at -5°C . were equal in every respect to those from fresh seed.

183. TAYLOR, C. T., AND RUPERT, J. A. 635.1/7: 631.531.17

A study of vegetable seed protectants.

Phytopathology, 1946, 36: 726-47, bibl. 37.

A study was made of the value of numerous chemicals in controlling damping-off of vegetable seedlings when dusted on the seeds. Arasan and other mixtures of tetramethyl thiuramdisulphide were the most effective of the seed protectants tested, except with lettuce. The protective value of Arasan and of related materials was in direct proportion to the dosage applied. Seed treatment with Arasan was successful with spinach, cucumber, carrot, cabbage, and tomato. On lettuce, both Arasan and Fermate were less beneficial than Cuprocid, the data indicating that Arasan and Fermate were actually injurious to it.

184. WARREN, G. F. 632.954
The value of several chemicals as selective herbicides for vegetable crops. (Preliminary reports.)
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 415-20.

Tests were made at Madison, Wis., in 1945 of a number of

named proprietary substances. Stoddard Solvent gave good results in carrots. G-506 (ammonium salt of dinitro-ortho-secondary butyl phenol) and perhaps Sinox showed promise in peas. Dilute H_2SO_4 was the best in onions, but, even so, was unsatisfactory. Sprays containing 2,4-dichlorophenoxyacetic acid killed all the vegetables in which they were applied.

185. BROOKS, A. N., MOORE, W. D., AND BORDERS, H. I. 635.1/7: 632.48

Sclerotinose of vegetables and tentative suggestions for its control.

Pr. Bull. Fla agric. Exp. Stat. 613, 1945, pp. 4.

Water soft rot or white mould of snap beans, caused by *Sclerotinia sclerotiorum*, has recently acquired grave importance on sandy loam and marl soils in Florida. The resulting rotting of beans on their way to market is the most serious aspect of the disease. Pending the results of large-scale experiments, successful use against the same organism when causing pink rot of celery suggests that cyanide may afford a control, and recommendations are made on that basis.

186. WHITE, W. H., AND DOOLITTLE, S. P.

635.1/7: 632.3/7

A vegetable gardener's handbook on insects and diseases.

Misc. Publ. U.S. Dep. Agric. 605, 1946, pp. 30.

This is a revision of Miscellaneous Publication 525, briefly abstracted in H.A., 14:1109. Information on DDT insecticides is now included.

187. CHANDLER, F. B., AND MILLER, M. C.

633.426: 546.27

The effect of boron on the vitamin C content of rutabagas.

Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 331-4, bibl. 13.

Rutabaga roots from Maine and Rhode Island, when grown on plots receiving boron, showed slightly higher vitamin C content. More noticeable, however, was the observation that the roots from the boron plots retained their vitamin C much better after dehydration and storage than those from non-boron plots.

188. DE WILLIGEN, A. H. A.

633.491: 581.43 + 581.192

Een en ander over anatomie en chemische samenstelling van den aardappel. (On the anatomy and chemical composition of the potato.) Reprinted from a Symposium over "Samenstelling en voedingswaarde van aardappelen en aardappel-producten" held on 23 July, 1943 at Utrecht, 10 pp.

The anatomy of potato stolons and tubers is described and the relation between the chemical composition of the tubers and certain botanical, agricultural and other factors that influence it are outlined.

189. DE WILLIGEN, A. H. A. 633.491: 581.192

De chemische samenstelling van den aardappel. (The chemical composition of the potato tuber.)

Reprinted from Landbouwk. Tijdschr., 1942, 54: 693-725. [Received October, 1946.]

The chemical composition of potatoes is discussed under (1) starch (with special reference to the relation between specific gravity, dry weight and starch content), (2) sugars, (3) ascorbic acid (vitamin C content), (4) proteins, and (5) composition of the ash (about nine-tenths of the ash consists of potassium salts).

190. DE WILLIGEN, A. H. A. 633.491: 581.192

Over het verband tusschen onderwater-gewicht, drogestofgehalte en zetmeelgehalte bij fabrieksaardappelen. (The relation between specific gravity, dry matter content and starch content of potatoes for processing.)

Dep. Landb. Vissch. Versl. landbouwk. Onderz. No. 49(4)A, 1943, pp. 125-64.

Scab infection [*Actinomyces scabies*] causes a noticeable lowering of the specific gravity of potatoes without any corresponding decrease in starch content. The difference in specific gravity is thus wholly caused by the infection of the outer layer and corresponds to the depth attained by the scab. With samples from lime-status trial fields a relation was established between the lowering of the specific gravity with regard to starch content and the cause of the severe infection, viz. the lime-status. During the development of the potato plant the relation between specific gravity and starch content changes. The change is most pronounced in the earliest stages, and at the time of ripening and even in late lifted tubers it is of little importance, so that this factor has no influence on the processing of potatoes. There is sometimes a difference to be noted from one lifting time to another, and this may possibly be attributed to factors other than time of ripening.

191. DE WILLIGEN, A. H. A.

633.491: 577.17: 581.192

Over den invloed van hetero-auxine op zetmeelopbrengst en zetmeelwaliteit van den aardappel. (On the influence of hetero-auxin on starch yield and quality of potato.)

Reprinted from Landbouwk. Tijdschr., 1943, 55, No. 678, 4 pp. [Received October, 1946.]

The investigations described aimed at reproducing, under Dutch conditions, the experiments of Zika (*Planta*, 1939, 30: 151; *J. Landw.*, 1942, 89: 64) in which, by the application of hetero-auxin to seed potatoes, a stimulation in growth and an increased yield were produced. In the author's trials no increase in yield, starch content or size of starch grains was observed.

192. WIERSEMA, H. T.

633.491: 581.162.3

Het problema van de steriliteit bij de aardappel. (Sterility in potatoes.)

Reprinted from Meded. N.A.K., 1944, 1: 21-3.

The author discusses the factors underlying the low fertility in certain potato varieties which is disadvantageous in breeding experiments. He then describes a method of increasing fertility. It consists essentially in first sprouting the seed tuber in moist sand. After about 3 weeks the tuber, now rooted, is placed on a brick in the open ground and the roots, arranged in two bundles, are placed in the ground. The plant is then covered with a double sliding cover with a central hole to allow the shoots to grow out. The tuber-producing stolons, which thus grow out into the air from the base of the shoots, are removed as they develop. The plant is thus protected from unfavourable weather, and the removal of the stolons diverts greater quantities of foodstuffs into the haulms and induces greater fertility than in plants not so treated.

193. NEUWEILER, E.

633.491-1.532

Kartoffelanbauversuche. (Seed potato growing trials in Switzerland.) [French summary 1 p.]

7te. Ber. Eidg. landw. Versuchsanst. Zürich-Oerlikon, being reprint from Landw. Jb. Schweiz, 1944, 58: 865-89.

A detailed report is given of the 1938-43 trials with seed potatoes grown in different localities in Switzerland, both in the Mittelland and at high altitudes. A large number of varieties have been used in these tests. In the Mittelland virus disease was found to increase, especially in the third year, while in the mountain localities virus-infected plants averaged less than 4% after the same period.

194. PUSHKARNATH, —

633.491-1.532

Sprouting method of growing potatoes.

Ind. Fmg. 1946, 7: 182.

A method is described of raising plants from the sprouts of seed potatoes. When the sprouts are about $1\frac{1}{2}$ to $2\frac{1}{2}$ in. long they are removed and planted in beds. Within 2 or 3 days they develop a green colour, the sprouts are already

established and in 3 or 4 days more young shoots will appear at the growing point. A sprout develops a crown of young but fully formed leaves within 2 or 3 weeks, and when it is about 3 to 4 inches high it may be transplanted to the field.

195. KUMAR, K., AND TANDON, S. L. 633.491-1.8
Nitrogenous fertilizers in relation to the keeping quality of potatoes.
Curr. Sci., 1946, 15: 318.

The data obtained showed that small tubers had a better keeping quality than large tubers, and that the application of ammonium sulphate increased rotting in storage.

196. MACVICAR, R., TOTTINGHAM, W. E., AND RIEMAN, G. H. 633.491: 581.192: 546.27
Boron supply and boron content of potatoes.
Soil Sci., 1946, 62: 337-40, bibl. 5.

The boron content of potato leaf and tuber tissue can be correlated with soluble soil boron on soils of similar texture. The boron content of leaves and tubers grown on plots supplied with 150 pounds of borax per acre was approximately eleven times that of plants receiving no additional borax. It would appear that the potato plant can tolerate boron levels of 100 to 150 p.p.m. in leaf tissue, and that levels in excess of 300 p.p.m. are definitely toxic.

197. REESTMAN, A. J. 633.491-2.8
De betekenis van de virusziekten van de aardappel naar aanleiding van proeven met gekeurd en ongekeurd pootgoed. (The importance of the virus diseases of the potato in connexion with experiments with certified and uncertified seed.) [English summary.]
Tijdschr. PLZiekt., 1946, 52: 97-117.

A comparison was made between the yields over 4 years of potato plants attacked by virus diseases (especially leaf roll) and healthy plants. The decline in yield from common mosaic was generally less severe than the loss due to leaf roll. The decrease caused by a combination of leaf roll and mosaic and by crinkle was, in general, greater than the loss caused by leaf roll alone. It appeared that the yield of healthy plants with diseased plants as neighbours was larger than that of healthy plants with healthy neighbours; the yields of healthy plants in a plot increased with the number of plants attacked by leaf roll. The increase in yield of a healthy plant with a leaf roll plant as neighbour was generally from 5% to 7%. The number of tubers from the healthy plants was, on the whole, higher than that from the diseased ones. A straight line correlation was found between the number of tubers and the yield. The average weight of the tubers increased with the yield; in the low yielding classes the increase of the average weight of the tuber was greater than in the classes with a high yield.

198. SUHOV, K. S., AND VOVK, A. M. 633.491-2.8
The potato big bud disease. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1946, 11: 24-9, bibl. 6.

Outbreaks of the big bud disease in potatoes in Russia is reported. Its identity with big bud of tomatoes, a serious disease in Russia, was confirmed by grafting diseased potato shoots on to tomato, with positive results. The symptoms on potato, described in detail, are briefly these: The leaflets of the young leaves are small and curled, some leaves consisting of one leaflet only, or the leaves may be compound but the leaflets reduced in size and more pointed. The shoots are more numerous and more upright than those of normal plants. The upper leaves develop anthocyanin giving a "purple top" appearance similar to that of potatoes infected with the aster yellows virus. There is a tendency for diseased plants to produce aerial tubers. The authors consider that in the Moscow area the vector is a cicada, *Macrosteles quadripunctatus*, the vector of kok saghyz yellows, the virus of which they consider to be identical with that of aster yellows and of big bud.

199. ROSS, A. F. 633.491-2.8
Studies on the cause of stem-end browning in Green Mountain potatoes.
Phytopathology, 1946, 36: 925-36, bibl. 11.

Stem-end browning in Green Mountain potatoes is characterized by a marked necrosis of the xylem, phloem, and adjacent parenchyma cells of the stem end of the tuber. The results of experiments described indicate the presence of a virus in those lots highly subject to the disease and the absence of a virus in the other type. It is suggested, therefore, that a virus is the cause of the disease and that different strains of virus account for the difference in potentiality of stem-end-browning development evident in different commercial strains of the Green Mountain potato variety.

200. SNYDER, W. C., THOMAS, H. E., AND FAIRCHILD, S. J. 633.491-2.8
Spindling or hair sprout of potato.
Phytopathology, 1946, 36: 897-903, bibl. 29.

It is shown that typical spindling sprout or hair sprout of potatoes may be a symptom of psyllid yellows, when psyllids are present on plants approaching maturity. The form of spindling sprout studied is not tuber-transmitted and there is no evidence that it is caused by a virus. The yield from the affected tubers was about half that from normal sprouting tubers. Severely affected tubers may fail to sprout.

201. CALDWELL, N. E. H. 633.491-2.78
The potato tuber moth and D.D.T.
Qd agric. J., 1946, 63: 81-2.

In southern Queensland the spring potato crop suffers normally from the potato tuber moth, *Gnorimoschema operculella* Gn., the larvae of which attack all parts of the plant. It has been demonstrated that DDT will give a very good kill of tuber moth larvae in the leaves and stems of potatoes as well as of other susceptible plants such as tobacco and egg plant. Growers are advised to apply a DDT spray at fortnightly intervals from the main flowering period onwards. This will mean at least three, and perhaps four or five, applications. A spray will give better results than a dust and should contain 0.1% DDT. The rate of application will probably range from 60 to 100 gallons per acre and the spray is best applied by means of the power outfits now available for this purpose.

202. LLOYD, N. C. 633.491-2.78
Insecticidal control of potato moth. Promising results with D.D.T.
Agric. Gaz. N.S.W., 1946, 57: 229-33.

The aim of the experiments described was to eliminate potato moth (*Gnorimoschema operculella*) in the foliage during the early part of the season so that during the late period, when the tubers are maturing, there will be very few, if any, moths present to infest them. Field experiments using 2% DDT dust gave very good results. In one experiment the estimated overall cost of three dustings was £7. 10s., by far the greater part of which was the cost of the DDT. The yield averaged 4 tons per acre, and it was estimated that approximately 1 ton per acre was saved by dusting. In replicated small plot experiments DDT dust at 1% has given just as good results as the 2% dust, and there is a possibility that it will give just as good field control. If so, the cost for materials would be considerably lessened, and the overall cost of two dustings would be about £2. 5s. It is hoped to obtain control with two applications by beginning to dust early in the season, as soon as the pest appears.

203. LIST, G. M., AND EDMUNDSON, W. C. 632.951: 633.491
Spraying and dusting potatoes with DDT and other materials.
Amer. Potato J., 1946, 23: 347-52.

The following notes are taken from the summary of trials at

Greeley, Colorado, in 1945. 1 lb. DDT in 100 gallons of water, of bordeaux mixture or of Dithane solution gave good control of the tuber flea beetle as regards tubers. DDT appeared to be compatible with both substances. The same treatment reduced leaf injury caused by flea beetles. 3% DDT dusts at 25 lb. per acre failed to control tuber flea beetles. DDT and other treatments all reduced the *Lygus* population. All DDT treatments significantly reduced leaf hoppers.

204. SEARLE, G. O. 633.52
Research in the flax industry.
Ann. appl. Biol., 1946, 33: 326-31.

The problems of the flax industry are discussed under seven sections, viz. (1) botanical (breeding, physiology and morphology), (2) agricultural (soil types, agricultural operations, herbicides, fungicides, hormones), (3) harvesting, (4) storing, (5) retting, (6) fibre separation, (7) by-products.

205. MCGREGOR, W. G. 633.52(71)
The production of flaxseed in Canada.
Publ. Dep. Agric. Canada 545, 1946, pp. 16, being *Fmr's Bull.* 23.

This is the revised edition of a bulletin published in 1936. In the years before the second world war, flaxseed production and consumption in Canada were insignificant. Since then, production has been stepped up and the Dominion has become a flaxseed-exporting country. At the peak period, in 1943, nearly 3 million acres were seeded to the crop, yielding over 17 million bushels, but by 1945 production had dropped to a little over 7 million. The present outlook for the flax market is considered promising. The cultivation of the crop is described and suitable varieties for growing in Canada are named.

206. DE HAHN, H. 633.52
Ontstaan en veredeling van het vlas. (Origin and improvement of flax.)
Reprinted from *Cultivator*, 1943, by the Institute for Plant Breeding, Wageningen, Holland, 15 pp. [Received September, 1946.]

This is a general review of the work that has been done, and is being done today, in raising and improving flax in various parts of the world. The regions where flax is cultivated and bred are taken in order and their activities are outlined.

207. COLHOUN, J. 633.52-2.4
Observations on the effects of browning (*Polyspora lini* Laff.) of flax on seed production.
Ann. appl. Biol., 1946, 33: 255-63.

Observations during three years showed that disinfection of flax seeds before sowing exercises an effect on the average weight of the well-developed seeds harvested, and the results obtained indicated that the intensity of the attack of browning in crops is inversely correlated with the weight of 1,000 well-developed seeds.

208. COLHOUN, J. 633.52-2.4
The relation between the contamination of flax seed with *Polyspora lini* Laff. and *Colletotrichum linicola* Pethybr. and Laff. and the incidence of disease in the crop.
Ann. appl. Biol., 1946, 33: 260-3.

Using naturally contaminated seed it is shown that the incidence of the seedling, stem-break and browning phases of attack by *Polyspora lini* Laff. in flax crops is related to the contamination of the seed with the parasite, the relationship being closer at low or moderate than at high levels of seed contamination. Heavy attacks of the disease did not occur when the number of contaminated seeds was less than 5%. A similar relationship was found to exist between the contamination of seed with *Colletotrichum linicola* Pethybr. and Laff. and the incidence of seedling blight in the crops. [Author's summary.]

209. MUSKETT, A. E., AND COLHOUN, J. 633.52-2.4
Seedborne diseases of flax and their control.
Ann. appl. Biol., 1946, 33: 331-3, bibl. 11.

The control of seed-borne diseases of flax are discussed in relation to *Colletotrichum linicola*, *Botrytis cinerea*, and *Phoma* sp. It was found that organo-mercurials were not effective as seed treatments for flax; this is accounted for by the smoothness of the flax seed with the consequent non-adherence of the dust. A product labelled R.D. 7846, named Nomersan, and containing tetramethylthiuram-disulphide as the active fungicide has given satisfactory results against *Colletotrichum linicola*, and its use as a disinfectant for flax seed became general in the British Isles as from 1941. Nomersan was not very effective against *Phoma*, and two proprietary products from the United States gave better results; these were New Improved Ceresan or Granosan containing ethyl mercury phosphate as its active constituent, and Arasan containing 50% tetramethylthiuramdisulphide as the fungicide. Granosan on account of its poisonous nature was discarded, but Arasan was made available and was used for disinfecting seed from the 1945 crop.

210. JORDAN, H. V., LANG, A. L., AND ENFIELD, G. H. 633.522

Effects of fertilizers on yields and breaking strengths of American hemp, *Cannabis sativa*.

J. Amer. Soc. Agron., 1946, 38: 551-63, bibl. 9.

The data from the experiments described lead to the following conclusions. Abundant nitrogen causes a more leafy and succulent type of growth in hemp, and tends to increase stem diameter above the optimum range. These characters were associated with lower breaking strength of fibre in these experiments. Hemp grows rapidly and adequate supplies of available nitrogen are essential for satisfactory crops. However, these data indicate clearly that excessive applications should be avoided. The problem is one of adjusting rates and balances of nutrients, in such a way as to assure maximum production and at the same time maintain fibre quality. From the point of view of the grower, some loss in fibre strength may be justified if the increased yields give a greater net income.

211. WATKINS, J. M. 633.522
Growth and fibre production of kenaf, *Hibiscus cannabinus* L., as affected by plant spacing in El Salvador.
J. Amer. Soc. Agron., 1946, 38: 978-82.

Yield data from the experiments described indicate that a planting distance of 12 inches between rows with 2 inches between plants is superior to closer or wider spacings; it also gives a better quality fibre, the seed can be drilled at this distance and there is less expense of weed control.

212. KOEHLER, B. 633.522-1.531.17
Hemp seed treatments in relation to different dosages and conditions of storage.
Phytopathology, 1946, 36: 937-42.

For treating hemp seed New Improved Ceresan is recommended at the rate of about 1 oz. per bushel, while Arasan and Spergon should be used at about 2 oz. per bushel. All three disinfectants produced striking increases in stand; this was due primarily to the prevention of pre-emergence seedling blight.

213. WILSIE, C. P., AND REDDY, C. S. 633.522-1.531.17

Seed treatment experiments with hemp.

J. Amer. Soc. Agron., 1946, 38: 693-701.

Treatment of hemp seed with Spergon, New Improved Ceresan, Arasan and Semesan Junior increased the stand under greenhouse conditions. In field experiments early plantings were usually not benefitted materially by seed treatment when high quality seed and normal seeding rates were used. In later plantings there was evidence that

seed treatment with New Improved Ceresan and Arasan frequently increased both stand and yield of straw.

214. O'KELLY, J. F. 633.525.1

Ramie: a possible source of bast fiber.

Inform. Sheet Miss. agric. Exp. Stat. 350, 1945, p. 1.

Ramie fibres are longer and stronger than flax and hemp fibres, though not so fine. Climatically the crop is suited by Mississippi conditions, but the right machinery for fibre extraction is still lacking. In Mississippi plantings are made in spring. Six-inch pieces of root are set in rows 3-4 feet apart and 18-24 inches in the drill. These should be covered 1-2 inches deep. The crop, which will grow to 6 feet or more on moist, fertile soils, requires an abundance of plant food and water. The stems are ready for harvest when growth stops.

215. ROEHRICH, O., AND BUI-XUÂN-NHUÂN. 633.525.1

La fibre de ramie, ses propriétés, ses qualités textiles. (Ramie fibre, its characteristics and textile qualities.)

Agron. trop., 1946, No. 5-6, pp. 261-89.

The purpose of this investigation was to study the textile properties of Ramie fibre as prepared by the method of Bui-Xuân-Nhuân and Larolay (Section Technique d'Agriculture Tropicale, 1945) and to compare it with other commercial samples and with allied fibres. The results are fully reported under the following heads: (1) Microscopic examination of the fibre, (2) the chemistry of Ramie fibre—composition and properties, (3) mechanical and physical characteristics. The influence of fibre properties on methods of preparation, manufacture and utilization is discussed.

216. CRANE, J. C., AND ACUÑA, J. B. 633.525.1

The effect of plant spacing and time of harvesting on fibre yield of ramie, *Boehmeria nivea* (L.) Gaud.

J. Amer. Soc. Agron., 1946, 38: 225-35, bibl. 19.

The experiments described were carried out at the Cuban Agricultural Experiment Station to examine the effect of plant-spacing and time of harvesting on growth and yield of fibre, using *Boehmeria nivea* type C, the most productive of 14 types tested at the Station. Data presented show that the percentage of fibre of the green weight of ramie stems does not increase with age of stem but may vary from one crop to another. Harvesting may be done at any time, but, depending on fibre quality, should be delayed until the ultimate height of the crop is reached for maximum production of fibre per unit of land. The average production of fibre from all spacings (12, 18 and 24 inches apart) of the 3-foot rows of the 60-day harvest was 6% and 24% greater than for the 2- and 4-foot rows, respectively. For the 90-day harvest, production from the 3-foot rows was 8% and 31% greater than for the 2- and 4-foot rows, respectively. Slightly larger yields from plants spaced 12 and 18 inches apart in the row than from plants spaced 24 inches apart were not sufficient to pay the cost of the additional plants needed for the closer spacings.

217. DU FRANE, B. 633.526.26

Mexico's istle industry.

Agric. Amer., 1946, 6: 71-3.

The Mexican fibres include istle, a hard fibre from certain species of the families *Amaryllidaceae* and *Liliaceae*. Fibres from the *Amaryllidaceae* are produced by lechuguilla (*Agave lechuguilla* Torr.) and Jaumave lechuguilla (*A. finkiana* Koch and Bouche). Collectively the fibres of these two plants are often combined under the title of istle de lechuguilla. In the lily family the fibre is produced by several plants, the most important being palma barrera (*Yucca carnerosana* (Trel.) McKelvey); others are the zamandoque plant (*Hesperaloe funifera* (Koch) Trel.) and palma pita or Spanish bayonet (*Yucca treculeana* Carrière).

Collectively the fibre of these plants is classified as istle de palma. Palma istle fibre is softer than that of lechuguilla and rots rather easily, while lechuguilla istle offers greater resistance to both humidity and water. Mexico manufactures many products from istle fibres both for home use and for export; this is carried on largely as a spare-time industry in the home, and most of the products are used locally.

218. SILVA FERNANDES, C. 633.526.23-2.19

O rolamento do broto do sisal: (*Agave sisalana* Perrine). (Bud-drop in sisal.)

Repr., Bol. S.A.I.C., Pernambuco, 1944, 11: 60-3.

A disorder of the sisal resulting in the abscission of the central bud is described. The young leaves of the bud develop a layer of thin-walled giant cells which collapse, turn brown and cut off the distal parts from the rest. The trouble is most frequent shortly after heavy rains following a prolonged drought.

219. TIHOVSKAJA, Z. P., AND PERVUHINA, N. V. 633.59

Elymus arenarius in the far-north—can it be brought under cultivation. [Russian.]

Priroda (Nature), 1946, No. 2, pp. 75-8.

The plants grow in far northern latitudes on sands, gravels and peats. They are easily propagated by means of their seeds and rhizomes, and can be used for plaiting, basketry and paper-making. The grain is used as human food, and the foliage as animal fodder.

220. İPEKÇİOĞLU, F. 633.71: 581.14

Tütünün korelatif vasıfları üzerinde bir tedkik. (Some correlative characters in the tobacco plant.) [English summary.]

İnhisarlar Tütün Inst. Rap., İstanbul, 1943, 3: 1: 5-8.

There is a strict or medium positive relation between the height and the number of leaves, and a strict relation between the number of leaves and maturity of the tobacco plant. In the same variety the increase in the number of leaves does not affect the total weight, because there is a decrease in the thickness of the leaves. The colour of the leaves is determined in the curing; usually the brightly-coloured fresh leaves in the field retain their bright colour after sun-curing. There is no relation between the colour of dry and fresh leaves and their nicotine content; the nicotine content of Turkish tobacco is generally low.

221. ORBAY, R. 633.71-1.531

Tütün tohumlarının kemal devresi üzerinde müşahedeler. (Maturity tests with tobacco seeds.) [French summary.]

İnhisarlar Tütün Inst. Rap., İstanbul, 1943, 3: 1: 13-16, bibl. 7.

Tobacco seed was collected at three periods during ripening and tested for germination. The conclusions drawn are: The seed should be collected when fully ripe, when the capsules and peduncles have become quite brown. In exceptional meteorological conditions the seed may have to be taken from capsules partly brown and with yellow peduncles (semi-maturity); these show hardly any difference in germination from those collected when fully mature. Seeds obtained when the capsules and peduncles are still green (incomplete maturity) are of feeble germination and no practical importance. It helps germination to leave the seed, collected after complete maturity, in the capsules until the capsules and peduncles are quite dry.

222. SHEAR, G. M. 633.71-1.8

Plant tissue tests versus soil tests for determining the availability of nutrients for tobacco.

Bull. Va agric. Exp. Stat. 84, 1943, pp. 12, bibl. 11.

In the case of moderate to severe N, P or K deficiency, tissue tests were found to be a more reliable indicator of fertilizer needs than was soil analysis.

223. TOMUR, K. 612.014.44: 633.71-1.531
Tütün tohum çeşidlerinin inatş muayenelerinde ziya faktorunun ehemmiyeti. (The influence of light in germinating tests with the Turkish tobacco varieties. [German summary.]
Inhisalar Tütün Inst. Rap., İstanbul, 1943, 3: 1: 9-12, bibl. 9.

A favourable influence of light on the germination of tobacco seed in tests with Turkish varieties was observed, and this is in agreement with results obtained by other authors. This preliminary result shows the necessity for further comparative tests with different varieties in order to obtain a basis for seed control with Turkish tobacco varieties.

224. WOODMAN, C. W., RAPP, K. E., AND MCHARGUE, J. S. 633.71: 581.192
Nicotine content of *Nicotiana rustica* grown in Kentucky and of 15 selections of dark tobacco. *Bull. Ky agric. Exp. Stat.* 470, 1944, pp. 11, bibl. 10.

Although the Brasilia and Olson varieties of *Nicotiana rustica* tobacco produced tobacco fairly high in nicotine, 5-6% to 8-8%, in the glasshouse, when grown in the field the range was only 0.65 to 2.64.

225. İPEKÖĞLÜ, F., AND TÜRKDOĞAN, A. 633.71: 632.951
Nikotin'in zararlı böcek mücadeleindeki ehemmiyeti. Tütün sularının en uygun şekilde hazırlanması ve kıymetlendirilmesi. (The importance of nicotine in pest control and the best way for farmers to obtain the nicotine solution.) [English summary.]
Inhisalar Tütün Inst. Rap., İstanbul, 1943, 3: 1: 17-22.

The nicotine solution is prepared by diluting the nicotine extract or by soaking tobacco leaves in water. The soaking time, the quality and quantity of the leaves, and the temperature of the water affect the concentration of nicotine in solution. By repeating the process in the same water a richer solution can be obtained. The highest extraction solution (75-90%) can be obtained by using water 5 to 9 times the weight of the leaves and soaking for 24 hours.

226. RYŽKOV, V. L., CMIRNOVA, V. A., AND GORODSKAJA, O. C. 633.71-2.8
On the mechanism of the inhibition of the autoreproduction of tobacco mosaic virus by thiamine. [Russian, English summary.]
Biochimija, 1946, 11: 197-202.

The necrotic reaction in leaves of *Nicotiana glutinosa*, produced by the tobacco mosaic virus, is inhibited by nifline, hydroxylamine, phenylhydrazine, rivanol, and iniprophenol. Thiamine produces a decrease of the virus content in isolated tobacco leaves and in the roots of tomato plants grown in a solution of the vitamin. The substances mentioned do not inactivate the virus *in vitro*.

227. KIGHTLINGER, C. V. 633.71-2.4
Black root rot resistant strains of Havana seed tobacco for the Connecticut Valley. *Bull. Mass. agric. Exp. Stat.* 432, 1946, pp. 20.

Controlled breeding methods have led to the production of two strains of Havana seed—Havana 211 and Havana K2—both of which appear to offer promising combinations of type, quality, yielding capacity and resistance to black root rot (*Thielaviopsis basicola*). The new strains were compared with "regular Havana seed" for type and quality, and with Havana 142 for disease resistance. Havana 211 is now extensively grown in the Connecticut Valley; its superiority when grown on black root rot soils is universally accepted, but some buyers are still sceptical as to whether it is equal to "regular Havana seed" under disease-free conditions. From the growers' standpoint, its chief

drawback is that it matures 7-10 days later than "regular Havana seed". Less is known at present about the quality characteristics of Havana K2, but from information available it may prove slightly superior to Havana 211, especially as regards certain type characters, date of maturity and curing properties.

228. CANNON, R. C. 633.71-2.651.3
Control of nematodes in tobacco seed-beds. *Qd agric. J.*, 1946, 63: 20-1.

The root-knot nematode (*Heterodera marioni* (Cornu) Goodey) has become a major pest in tobacco-growing areas of tropical North Queensland. Plants may be attacked at any stage of growth, but the earlier the initial infestation, the greater the likelihood of heavy crop losses. The aim should be to ensure that seedlings are free from nematodes when planted out in the field, and this calls for particular attention to seed-bed preparation. Growers are strongly recommended to disinfect seed-bed soils by the heat method. The organic matter from termite nests is preferable to brushwood as it is more easily handled and burns steadily and uniformly. A day or two before burning, the soil should be fairly well prepared and watered. The fuel should be spread evenly over the surface, including pathways and a margin of 2 or 3 feet around the area. Termite nest material should be applied as a layer at least 4 inches thick, whilst brushwood might be piled several feet high. When the ground has cooled the resultant ash should be raked in and the unburnt fragments removed, after which the fertilizer may be applied and the bed prepared for sowing.

229. AKKOYUNLU, Z. 633.79
Şerbetçi otu (hublon) üzerindeki 1940-42 çalışmaları. (Studies on hop cultivation at the tobacco institute in 1940-42.) [English summary.]
Inhisalar Tütün Inst. Rap., İstanbul, 1943, 3: 1: 23-35.

Owing to the difficulty and expense of obtaining hops from abroad in recent years the Turkish Tobacco Institute is carrying out trials with the object of cultivating hops in that country, using Czechoslovakian hops and "the hops that grow like wild hops" in Turkey. Brewing trials showed that the Czechoslovakian hops made "ordinary beer", and that from the wild type of hops "beer of sweet taste" could be prepared.

230. GOLUBINSKIİ, I. N. 633.79
A new hop variety clone No. 18. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1946, 11: 6-9.

A variety of hop referred to as Clone No. 18 was selected at the Ukraine plant breeding station because of its high yield and percentage of resins. Its botanical characters are given in detail. In general its reaction to pests and diseases is similar to that of other varieties, but it is more resistant to mildew (*Pseudoperonospora humuli*). One of its chief features is its tolerance of unfavourable environmental conditions. It has been grown in the nursery of the breeding station at the same time as certain new varieties raised in England by Professor Salmon; under Ukraine conditions it proved superior to the English varieties.

231. ZYKOV, I. V. 633.8
Chamaenerium angustifolium (L.) Scop. and its utilisation in the north. [Russian.]
Priroda (Nature), 1946, No. 1, pp. 78-80.

The plant grows in northern latitudes where it occurs in abundance on dry and sandy soil. It is used by the inhabitants as a substitute for tea. It contains vitamin C in some quantity. Its flowers, which form a large mass of colour, are a source of nectar. Despite its hardness and deep root system, enabling it to survive on poor soils and in drought, it need not be feared as a weed, for it can easily be eliminated by other crops and by ordinary tillage. It can be propagated by means of its seeds and roots, or by cuttings.

232. RANGASWAMI, S., AND SANKARASUBRAMANIAN, S. 633.8

Chemical components of the flowers of *Moringa pterygosperma*.

Curr. Sci., 1946, 15: 316-7.

Experimental results indicate that the medicinal properties of moringa flowers are to be ascribed partly to the basic constituents present in traces and partly to the inorganic salts (potassium and calcium) present in fair amounts. Since the essential oil is present only in insignificant amounts the dried flowers should be almost as useful as the fresh ones.

233. SMITH, M. G., AND ROBERTSON, L. 633.822: 633.85

An economic analysis of the production of peppermint and spearmint oils in Indiana.

Bull. Ind. agric. Exp. Stat. 459, 1941, pp. 31.

Nearly 50% of the United States' peppermint and spearmint crop is grown on about 20,000 acres of muck soils in Indiana. An economic survey of the industry showed that intensive weed control, applications of potash and phosphate fertilizers and pest and disease control are profitable. The English variety of peppermint produced higher yields and was more profitable than the American.

234. STANKOV, S. S. 633.85(47)

Wild growing oil plants of the U.S.S.R. and their practical utilization. [Russian.]

Stelzhogiz, Moscow, 1944, pp. 78, bibl. 43, price 1.5 Roubles.

This useful booklet is published under the auspices of the Committee of Plant Resources of the All-Union Council of Scientific Engineering and Technical Societies. The plants are described under three main categories: (a) those that are the source of fatty drying oils; (b) those that furnish semi-drying fatty oils; and (c) those that yield non-drying fatty oils. Under each category details are given, with their Latin names, of species of trees, shrubs, and plants belonging to the *Linaceae*, *Labiatae*, *Cruciferae*, *Compositae* and some other families. In addition, information is provided on the chemical and technological quality of oils obtained from 156 different plants, together with notes on industrial uses of such oils. There is also a very useful list of common Russian names of plants described in the text.

235. KOZO-POLJANSKI, B. 633.85: 581.46

Floral mechanism of *Lallemantia*.

C.R. Acad. Sci. U.R.S.S., 51: 645-7.

Lallemantia iberica F. & M. is a source of oil, and the author considers a detailed knowledge of its flower to be necessary in plant breeding. The flower is figured and its pollination mechanism is described.

236. DIJKSTRA, S. P. 633.85

De etherische olie voorkomende in de wortels van hier te lande gekweekte *Archangelica officinalis* Hoffm. (*Angelica archangelica* L.). (The ethereal oil of angelica.)

Meded. Direct. Tuinb., 1946, p. 693.

450 kg. of angelica roots yielded, on distillation, 568 g. of oleum angelicum, the characters and composition of which are tabulated. A detailed analysis showed the presence of *d*- α -phellandrene, α -pinene, oxypentadecyl acid and methyl-ethylacetic acid.

237. FARRINGER, D. E. 633.853.74

Sesame.

Agric. Amer., 1946, 6: 160-3.

The seeds of sesame (*Sesamum indicum*) vary in size, weight and colour, depending upon the variety and growth. They are generally white or pale yellow, though dark red, brown and black seeds are sometimes produced. Those of unimproved varieties are about the size of flaxseed and are generally pear-shaped. Their oil content varies from 45%

to 55%. Primitive planting methods are commonly employed, since sesame is grown in regions of abundant labour where little farm machinery is used. The two common varieties in Mexico are known as "triguena" or "morena", the most widely cultivated, and "criollo" or white. The criollo is the larger plant, but it takes longer to mature and requires a more fertile soil. The yields of both varieties vary from 200 to more than 1,000 lb. per acre. Sesame exports represented about 7% of the value of Nicaraguan agricultural products shipped in 1943, being surpassed only by coffee, rubber and timber.

238. LANGHAM, D. G., AND RODRIGUEZ, M. 633.853.74

El ajonjolí, su cultivo, explotación y mejoramiento. (Sesame, its cultivation, uses and improvement.)

Terc. Confer. interamer. Agric., Caracas, 1945, No. 31, 137 pp., bibl. 31.

This is a general account of sesame, its varieties and types, cultivation, diseases and pests, extraction of oil, followed by more specific subjects such as: fertile tetraploids induced by colchicine, a new method of controlled pollination, hybridization, variation and genetics, and tables of experimental data.

239. WEIBEL, R. O., AND WOODWORTH, C. M. 633.853.55

Use of the natural crossing plot in making castor bean hybrids.

J. Amer. Soc. Agron., 1946, 38: 563-5.

Hybridizing castor beans by hand is laborious and time-consuming, and *Alternaria* infection is likely to result from the high humidity inside the bag and from injury to the spike during emasculating. The natural crossing plot furnishes a means of producing large amounts of seed of a given cross. It is here described.

240. KARP, M. L. 633.859: 581.192

On the occasional absence of opium in the opium poppy.

C.R. Acad. Sci. U.R.S.S., 1946, 52: 537-40.

Among the plants of an opium poppy plantation some will be found without opium, the proportion of such plants varying with the environment. They are rare on poor soils, while on richer soils they may attain to 25% to 30% or even 45%, resulting in a great reduction of yield. The problem is being investigated at Kirghiz Experiment Station of Drug Plants where it was found that the proportion of opiumless plants varied from 0 to 40%. There was no plot containing opiumless plants only. The author states that for the detailed study of the genetic nature of the absence of opium further investigations are necessary, but the data published strengthen his confidence in the genetic determination of this character.

241. PHILP, J., AND SHERRY, S. P. 633.879-1.523

The degree of natural crossing in green wattle, *Acacia decurrens* Willd., and its bearing on wattle breeding.

J. S. Afr. For. Ass., 1946, No. 14, pp. 28, bibl. 40.

In the Union of South Africa about half a million wattle trees are grown for the tanning properties in wattle bark. Since the species in question exhibit a high degree of heterosis, it is suggested that the breeding programme be based on methods which have proved so successful with maize. Although the difficulties connected with a wattle breeding programme are emphasized, a profitable result with regard to bark and timber yield is anticipated, if it were carried out. Data on genetical experiments are given.

242. DOUGHERTY, J. L. 633.879

Acacia negra industry in Rio Grande do Sul.

Agric. Amer., 1946, 6: 139-41, 147.

The black wattle (*Acacia negra*) is grown on a considerable scale on the undulating slopes and low hills of east-central Rio Grande do Sul (Brazil). A tannin extracted from the

bark is useful in tanning soft leathers and the wood furnishes fuel. Although acacia seems to do well on poor soils, the amount of bark produced may be somewhat smaller than if grown on richer soils; the amount of tannin in the bark, however, seems to run from 25% to 35% for each kilo of dried bark whether the bark is produced on poor or rich soils. Diseases and insects cause an average 20% loss in trees. Ants, termites and borers appear to be the worst pests. Arsenicals and carbon bisulphide are constantly used for the control of the leaf-cutting *Saúva* ant.

243. CROCKER, R. L., AND TRUMBLE, H. C. 633.913
Investigations on guayule (*Parthenium argen-*
tatum Gray) in South Australia.
Bull. Coun. Sci. industr. Res. Aust. 192, 1945,
pp. 44 + 12 plates, bibl. 13.

The investigations are a wartime project. In South Australia effective establishment of guayule is confined to the areas where rainfall is assured in the early spring months. With irrigation, however, the requirements of the crop can be met without such comparatively narrow limitations. Rubber yield from suitable strains two years from seeding in the nurseries amounted to 175 lb. per acre (7,000 plants). With regard to future prospects of the industry, which is still in its experimental stage, the authors do not commit themselves. The principal data of the investigation are presented.

244. GARDNER, E. J. 633.913: 581.162.3
Wind pollination in guayule, *Parthenium argen-*
tatum Gray.
J. Amer. Soc. Agron., 1946, 38: 264-72, bibl. 9.

Guayule pollen is carried at least 850 yards by the wind at Salinas, California, the amount carried at any given time depending on the velocity of the wind and the amount of pollen present at the source. Muslin is a more effective barrier against pollen than cheesecloth in pollination tests, but, since it excludes much light, care must be taken to prevent damage to the plant. It is shown that wind-borne pollen is viable. The germinating power of pollen decreased gradually with age to the sixth day and then dropped off abruptly. It is doubtful, therefore, whether pollen more than 7 days old is effective in pollination.

245. KELLEY, O. J., AND OTHERS. 633.913
Increased rubber production from thickly seeded
guayule.
J. Amer. Soc. Agron., 1946, 38: 589-613, bibl. 11.

Experiments were conducted to study the effects of variations in spacing, irrigation, fertility and clipping treatments on tons of shrub per acre, percentage of rubber, and pounds of rubber per acre produced by guayule grown from seed for periods ranging from 19 to 23 months. The results indicate that for maximum rubber production dense stands of plants are to be recommended, especially for short-cycle production. The optimum irrigation and fertility treatments are closely related to soil and climatic conditions.

246. TINGEY, D. C., AND FOOTE, W. H. 633.913-1.67
Effect of irrigation on the resumption of growth of
guayule transplants.
J. Amer. Soc. Agron., 1946, 38: 896-904.

Irrigating guayule soon after transplanting resulted in an average of 87% of the plants showing new growth in 30 days and 89% in 60 days after transplanting. Irrigating 2 and 3 months after transplanting resulted in as high a percentage of plants with new growth 30 and 60 days after irrigating as those irrigated immediately after transplanting. Transplantings made in early June and irrigated soon afterwards showed about 90% of the plants with new growth in 38 days.

247. RETZER, J. L., AND MOGEN, C. A. 633.913-1.415.3
The salt tolerance of guayule.
J. Amer. Soc. Agron., 1946, 38: 728-42, bibl. 7.

The observations discussed were carried out in guayule plantations where salt concentrations had killed the plants

and retarded their growth. It was found that guayule usually was killed or did not grow after transplanting where salt concentrations were 0-6% in either the first or second foot, but it grew well where the concentration did not exceed 0-3% in the 5-foot profile.

248. DAVIS, C. H. 631.67: 631.459: 633.913.
A headland designed to facilitate irrigation in
erosive soil.
J. Amer. Soc. Agron., 1946, 38: 859-63.

In experimental plantings of guayule, on fine sand characteristic of the mesa in Arizona, controlled irrigation seemed impossible because of rapid soil erosion, and because of the streams required by rapid water penetrations. As a result of experiments a satisfactory method of irrigation was developed, the essential feature of which is a specially designed headland. The author summarizes his results as follows: A low area next to the ditch with a gradual rise in ground surface between the outline and the area to be irrigated has been called a "stilling headland"; this was the most practical means of irrigation for a very erosive soil. The water velocity was reduced from the outlet velocity to practically still water in the low area next to the ditch. The rate of flow was slow enough to prevent any erosion as the water moved slowly and smoothly to the furrow entrance. The shallowest depth of water and highest velocity was in the furrow and, therefore, did not interfere with the even distribution of water.

249. PRESLEY, J. T. 633.913-2.4
Diplodia die-back of guayule (*Parthenium argen-*
tatum Gray).
Phytopathology, 1946, 36: 565-71.

A severe die-back of 2-year-old irrigated guayule in south Texas in late summer and early fall of 1944 was caused by *Diplodia theobromae*. Young irrigated shrub and 2-year-old shrub on dry-land plantings were not appreciably affected. In the field the leaf infections begin as irregular necrotic lesions which soon coalesce. The leaves die, generally from the tip, with pronounced yellowing of the leaf after one-half of the blade has been killed. When the lesion has nearly girdled a large branch, the leaves become yellow and the diseased branch is very conspicuous among healthy foliage. Inoculation tests showed that a high relative humidity and high air temperatures are necessary for rapid infection. Hardened plants with old dry leaves are more susceptible than young succulent plants with green active leaves.

250. BENEDICT, H. M., AND KROFCEK, A. W. 633.913: 632.954
The effect of petroleum oil herbicides on the
growth of guayule and weed seedlings.
J. Amer. Soc. Agron., 1946, 38: 882-95, bibl. 8.

Adequate control of weeds in nurseries of field seedlings of guayule was obtained by spraying with a mixture of three-fourths stove oil and one-fourth diesel oil applied at a rate of 32-4 gallons per acre. It was necessary to make the first application while the weeds were in the cotyledon stage, or about 2 weeks after seeding when the weeds and also the guayule were susceptible to oil-injury. However, the guayule was so much more resistant to the oil that almost complete killing of the weeds and no killing of the guayule was obtained.

251. IVANOV, N. I. (Editor). 633.913
The agrotechnique of kok saghyz. [Russian.]
Ogiz, Selkhozgiz, Moscow, 1944, 144 pp., 3 roubles.

An account of kok saghyz and its cultivation describing: The biological characters of the vegetative and reproductive organs; climatic and soil requirements; choice of soils; the preceding crops and rotation; manuring; the preparation of seed for sowing; the technique of line sowing and of "nest" sowing; growing kok saghyz from seedlings; care and cultivation in the plantation; pests and diseases and their control; harvesting, drying and cleaning the seed;

lifting the roots; breeding; and organizing the work for kok saghyz culture. The book contains 38 tables and 37 figures, about half of which illustrate the implements used.

252. KOLESNIK, I. D. 633.913
Hill planting of kok-saghyz. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1946, 11:
15-19.

Experiments with hill planting of kok saghyz have shown that this method has distinct advantages over the ordinary methods of planting, chiefly in a greater yield, better root development, and a significant economy of labour at harvest-time. The yield from a one-year-old hill planting is so satisfactory that the growing of kok saghyz as a one-year crop can be recommended.

253. MOLOTKOVSKIĬ, G. H. 633.913-1.535
On the physiological nature of the reversion of
polarity in the cuttings of kok-saghyz.
C.R. Acad. Sci. U.R.S.S., 1946, 52: 551-2.

Repolarization of cuttings is often observed in experiments on vegetative propagation of kok saghyz. Cuttings of one-year-old plants were cultivated vertically upside down. The basal parts of the cuttings reproduced the leaf rosette with the same frequency as in the field. No difference was found between cuttings of different size. The formation of the leaves at the basal part of the cutting was preceded by their appearance at its apical end which was directed downwards. The physiology of the phenomenon is discussed. The author concludes that polarity is a property of the protoplasm.

254. PROKOFIEV, A. A. 633.913
The part played by different organs of the plant in
rubber formation.
C.R. Acad. Sci. U.R.S.S., 1946, 52: 85-8.

In studies on the transportation of rubber within the plant, kok saghyz and krym saghyz were grafted each on itself and on the other and also on dandelion. It was found that they grew better and produced more flower stalks on dandelion than upon their own roots. Non-rubber yielding stock (dandelion) thus enhanced the growth and development of the rubber yielding scions. Rubber producing stocks produce an opposite effect on the growth and development of the dandelion. The rubber and resin accumulation and also their ratio remain fairly constant in the root of the stock, irrespective of the nature of the scion. On the other hand, the roots of dandelion always contain more resins than rubber and the ratio rubber: resin in this plant drops below unity. Irrespective of the nature of the scion, the roots of the dandelion remained poor in rubber.

255. PROKOFIEV, A. A. 633.913
On the filling of the laticiferous system of krym-
saghyz with latex of the common dandelion.
C.R. Acad. Sci. U.R.S.S., 1946, 52: 175-8.

The aim of the present investigation was to fill the laticiferous system of krym saghyz with latex of the common dandelion. Modifications of former grafting technique are described. Roots were split longitudinally into halves, the halves put together and fixed with fibre. Irrespective of the mode of the grafting the filling of the laticiferous system of krym saghyz with latex of dandelion was attained by a systematic tapping of a lateral root of krym saghyz protruding from an aperture made in the pot. The exudation of latex owing to tapping causes a shift in the whole mass of latex resulting in transportation of the latex contained in the laticiferous vessels of dandelion to the laticiferous system of krym saghyz. The data obtained show that at the beginning of tapping the lateral root of krym saghyz gives off latex of krym saghyz. Later on, as tapping is continued, latex of dandelion is gradually admixed to the secreted latex, so that finally pure dandelion latex circulates in the laticiferous system of krym saghyz.

256. KOROLEVA, V. A. 633.913
The biological characteristics of kok-saghyz and
of the non-rubber bearing dandelion weeds which
infest it. [Russian.]
Vest. Soc. Rast. (Soviet Plant Industry Record),
1940, No. 2, pp. 12-31.

Nine *Taraxacum* species are described. The information given mainly relates to flowering, pollination, morphological features, and everything that will enable the species to be distinguished from kok saghyz and from each other. Hybrids of kok saghyz and some of the dandelion weed species were met with, but were usually sterile. Dormancy could be prevented by means of adequate nutrition, sufficient moisture, and the removal of inflorescences which had finished flowering.

257. MYNBAEV, K. 633.913: 581.02
The intra-clonal variability of morphological
characters and the content of rubber in kok-saghyz
in relation to environment. [Russian.]
Vest. Soc. Rast. (Soviet Plant Industry Record),
1940, No. 2, pp. 32-9. [Received 1946.]

Experiments are described which show that not only the visible characters of kok saghyz plants but also those more deep-seated and less evident are alike subject to the modifying influences of the external environment. It was found, for example, that both the character of the leaf margin and the amount of rubber which a plant was able to synthesize could be varied by manuring, temperature, and different light periods, and that therefore the one could not be taken as an indication of the other. The plants used in the experiments were all vegetatively propagated and belonged to distinct clones. Yet the degree of variation in the amounts of rubber contained in the plants was as high as that exhibited by plants grown from seed.

258. GIUBBENET, E. R., AND LERMAN, R. I. 633.956
Changes in the rate of accumulation of chlorophyll
in the leaves of *Perilla ocymoides* L. [Russian.]
Soversk. Bot., 1945, 13: 5: 22-4.

When *P. ocymoides* was grown near Leningrad, which is situated in a latitude where the days are long, the maximal rate of chlorophyll accumulation was reached during flowering and not, as is supposed by some investigators, during seed formation. This was late in the season, when there were only 12 hours of daylight. Previous investigators have already found that there is no direct relationship between the amount of chlorophyll contained in the leaves and the rate of photosynthesis. Having in view the evidence which indicates chlorophyll as a kind of protein which can be stored in various parts of a plant, the authors were able to note during flowering a revival of chlorophyll formation, even in old leaves, thus demonstrating the operation of Krenke's theory in the realm of plant physiological processes as well as in that of plant morphology.

259. GLENDENNING, R. 635.13: 632.77
The carrot rust fly, a new pest in British Columbia.
Processed Publ. Dep. Agric. Canada, Div. Ent. 52,
1946, pp. 5.

The carrot rust fly [carrot fly] was first noted in British Columbia in 1936. Since 1939 considerable damage has been caused by the pest to both field and garden carrots. Of the materials tested at Agassiz, only naphthalene and calomel proved reliable insecticides.

260. WRIGHT, D. W., AND ASHBY, D. G. 635.13: 632.77
Bionomics of the carrot fly (*Psila rosae* Fab.).

II. Soil populations of carrot fly during autumn, winter and spring.
Ann. appl. Biol., 1946, 33: 263-70.

The results of observations in East Anglia show that the carrot fly overwinters in both the larval and pupal conditions, and that the proportion of the individuals in each stage

varies from crop to crop and from season to season. The immature larvae persist longer in the carrots than in the soil. Mortality in the overwintering carrot-fly larvae and puparia varied considerably but was frequently heavy, the principal agencies concerned being a hymenopterous insect, *Dacnusa gracilis* Nees., and fungus and bacterial diseases. The data obtained are recorded in tables and graphs.

261. WARREN, G. F., AND HANNING, F. 632.954: 635.13
Effect of selective petroleum weed sprays on the yield and flavor of carrots.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 407-14, bibl. 6.

An account of tests at Madison, Wis., of various named petroleum oils shows that some at least, e.g. Stoddard Solvent, gave satisfactory control of all weeds except ragweed without impairing the flavour of the carrots at canning maturity. Notes are also given of injury sustained under certain conditions.

262. LACHMAN, W. H. 632.954: 635.13 + 635.14
The use of oil sprays as selective herbicides for carrots and parsnips II.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 423-33, bibl. 26.

Extensive tests at Amherst, Mass., have shown that Stoddard Solvent [known as "stove oil" in California, it is stated as being a naphthenic paint thinner and dry cleaning fluid] is valuable as a weed killer in fields of carrots and parsnips. Other umbelliferous crops that are resistant to this oil in the seedling stages are parsley, celery, dill, fennel, coriander, caraway, parsnip-rooted parsley, and celeriac. Some of these plants, particularly celery, are damaged by the spray in their later stages of development. A scorching or burning of the older leaves often occurs if the crops are sprayed while wet from rain or a heavy dew. A number of other oils and aromatic compounds were found to be good selective weedicides when their aromatic content was adjusted at 12% to 15% with kerosene, but none was so effective or quick-acting as the various types of Stoddard Solvent. Anethole, an aromatic compound common to members of the family Umbelliferae, was selective for carrots and killed weeds at a strength of 5%, using kerosene as the diluent. [Author's summary.]

263. NILSSON, F. 635.15: 631.531
Fröodlingsförsök med rädisa 1941-1945. (Seed growing experiments with radishes 1941-1945.) [English summary $\frac{1}{2}$ p.]
From reprint *Årsskr. Alnarps Lantbruks- Mejeri-Trädgårdst., 1946, pp. 73-90, bibl. 4, being Meddel. Statens Trädgårdssfrs.*

Four radish varieties were grown for seed at Alnarp and two other places in Sweden. Yields were satisfactory at Alnarp (average 1,390 kg. seed per hectare), where planting roots from hotbeds gave an earlier crop than drilling in the field. At one of the less favourably situated centres saltpetre manuring proved beneficial.

264. LORENZ, O. A., AND HOYLE, B. J. 635.25: 631.56
Effect of curing and time of topping on weight loss and chemical composition of onion bulbs.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 301-8, bibl. 2.

Topped and non-topped onion bulbs were cured under similar conditions for 3, 6 and 9 days in California. Untopped bulbs lost considerably more weight than topped bulbs during the first few days of curing. The tops of untopped plants were evidently removing water from the bulbs during the curing period and untopped bulbs were significantly higher in percentage dry matter after 3, 6 or 9 days than excised bulbs; they were also higher in absolute dry matter after curing than excised bulbs. All data

indicated the movement of some substance or substances from the tops to the bulbs during curing.

265. MAAN, W. J. 635.25: 632.77 + 632.78
De bestrijding van de uienvlieg en de preimot. (The control of the onion fly and the leek moth.)
Meded. Tuinb.Voorlicht.Dienst, 40, 1946, 30 pp., bibl. 13.

The morphology and life history of the onion fly, *Chortophila antiqua* (Mergen) and of the leek moth, *Acrolepia assectella* (Zeller) have been previously described by the author (see H.A., 16: 1512). The present bulletin discusses control measures based on results obtained by other workers and by himself. The best control of onion fly appears to be obtained by seed treatment with calomel: 1 kg. of seed is stirred in 5% starch paste and then 1 kg. of calomel stirred in. The treatment should be carried out shortly before sowing. Early sowing and planting out is recommended against the leek moth; and for this pest spraying with 0.1 nicotine + 0.2% Shell-spreader has given good results.

266. VAN DE POL, P. H. 635.31: 632.77
De aantasting van de aspergevlug in Noord Limburg. (The asparagus fly in North Limburg.)
Meded. Direct. Tuinb., 1946, pp. 629-31.

Severe infestations by the asparagus fly (*Platyparaea poeciloptera*) in North Limburg, Holland, are described. Its life history is outlined and control measures are discussed. It is emphasized that in any particular asparagus-growing region all the growers must take measures to control the fly: those who neglect to do so are a menace to their neighbours. All infested stems should be cut off at a depth of at least 6 cm. below ground level, and burnt on the spot.

267. MYERS, C. H., AND FISHER, W. I. 635.34: 631.531
Experimental method of cabbage breeding and seed production.
Mem. Cornell agric. Exp. Stat. 259, 1944, pp. 29, bibl. 19.

Although normally chromosome number is an index of capacity for crossing between species, the author found a form of wild cabbage (10) to cross readily with domestic cabbage varieties (9), while a radish (9) \times cabbage (9) cross is not easily obtained. Before genetic and cytological investigations were available, Sutton & Sons Reading, had shown in 1908 that all types of *Brassica oleracea* crossed readily with each other, but were not affected by the pollen of swedes, non-bulbing or oil-yielding rape (*B. campestris*) or turnip (*B. rapa*). This still holds good. Bees are the most important agents of pollination; wind can be practically disregarded. No definite statement is made on isolation requirements of stock seed plots. The bulk of the paper is devoted to breeding methods.

268. ISBELL, C. L. 635.34: 631.535.6
Further observations on and the application of propagating cabbage by leaf cuttings.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 335-9, bibl. 5.

Further observations on the behaviour of cabbage leaf cuttings and of the plants obtainable therefrom.

269. MOORE, E. L., AND CAMPBELL, J. A. 631.8: 635.1/7
Fertilizers for cabbage, peas, and tomatoes.
Bull. Miss. agric. Exp. Stat. 397, 1944, pp. 23.

As the result of 4 years' fertilizer experiments carried out in the Copiah County, Miss., trucking area, the following rates and composition are recommended: (1) Cabbage: 1,000 lb. per acre of a 6-8-4 fertilizer before planting plus side dressing with 100 lb. ammonium nitrate or its equivalent when the cold weather has passed. (2) Peas: 1,000 lb. per acre of a 5-10-5 fertilizer plus side dressing with 100 lb. nitrate of soda or its equivalent. (3) Tomatoes: 1,200 lb. per acre of a 5-10-5 fertilizer plus side dressing with 100 lb. ammonium nitrate or its equivalent 6 weeks after planting.

270. DAVIS, J. F. 635.34
A comparison of methods for harvesting experimental plots of cabbage.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 327-30, bibl. 4.
A comparison of methods of harvesting experimental plots of cabbage is presented from Cornell in which accurate estimates of plot yields can be obtained in several ways. It is thought that the procedure recommended here might well be used for such crops as sweet corn, sugar beets and similar crops. Methods in which yield estimates are based on a certain number of heads taken in a systematic manner, e.g. every 5th head, from all the available harvest area appear very promising.
271. GORLENKO, M. V., AND VORONKEVICH, I. V. 635.34: 632.3
The causative agent of the slimy bacteriosis of cabbage.
C.R. Acad. Sci. U.R.S.S., 1946, 52: 809-11.
The diseases described become noticeable at the stage of the formation of the cabbage heads. In severe infection the affected heads fall to the ground; they are completely rotten within and emit an obnoxious odour. From comparative cultural studies the causal organism is considered to be *Bacterium (Erwinia) aroidea* Stapp.
272. HABRAN, R. 632.78: 635.34/35
La teigne des crucifères (*Plutella cruciferarum* Zett.). (The cabbage moth).
Courr. hort., 1946, 8: 426.
A severe outbreak of the cabbage moth, *Plutella cruciferarum* (*P. maculipennis*) in Belgium in 1946 is reported. The life history of the moth is outlined. Control measures recommended are spraying or dusting with nicotine or derris or spraying with emulsified oils. Recently-introduced insecticides DDT and gammexane gave equally good or even better results. The use of arsenates is not recommended for plants of which the leaves are eaten (e.g. cabbage).
273. LORENZ, O. A. 635.34: 581.035 + 581.036
Response of Chinese cabbage to temperature and photoperiod.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 309-19, bibl. 4.
In trials at Davis, Calif., good quality Chinese cabbage (*Brassica pekinensis*) was obtained only from late summer and early autumn plantings. Given equal temperatures within a range conducive to flowering the plants flowered more rapidly under a 16-hour than an 8-hour day. Flowering was practically inhibited under natural or short days at temperatures averaging 80° or 90° F. or higher. Flower induction was hastened as temperature was lowered from about 70° to below 50° F. at equal day length. Notes are given of conditions found best both for rapid flowering and for maintenance in a vegetative state.
274. DEARBORN, C. H. 635.35: 631.811.9: 546.27
Boron nutrition of cauliflower in relation to browning.
Bull. Cornell agric. Exp. Stat. 778, 1942, pp. 29, bibl. 9.
Following a 30% loss of the cauliflower crop in the Catskill Mountain area of New York in 1934 owing to browning, experiments were started in 1935 to determine the cause of the disease and soon showed that browning is a physiological disorder due to boron deficiency. The symptoms of the trouble are described and microphotographs of cross sections of affected plants are presented. Greenhouse and field experiments showed that in Delaware County applications of 10 lb. of borax or more will prevent browning completely. Borax treatment at the rate of 10 lb. per acre was found to increase the fresh weight of the heads by 44% as compared with that of boron-deficient plants. The latter, however, showed a higher percentage of dry weight in relation to their fresh weight.
275. FRIEND, A. H. 635.35: 632.6/7
Cauliflower seed crop pests. Field experiments with the newer insecticides. Observations and results.
Agric. Gaz. N.S.W., 1946, 57: 181-2.
This is an account of pests found in a half-acre of cauliflower grown for seed in the 1945 season in the Metropolitan area of New South Wales, together with the results of control measures adopted and of field experiments using the newer insecticides against the slaty-grey aphid (*Brevicoryne brassicae*) and the Rutherglen bug (*Nysius vinitor*). Two other major pests were the cabbage moth (*Plutella maculipennis*) and the cabbage white butterfly (*Pieris rapae*). The field experiments showed that 2½% nicotine dust, 2% 666 dust and possibly 1% 666 dust are most useful for slaty-grey aphid control, and that DDT in dust and spray forms and, to a less extent, 666 (used in dust form only), are useful against the Rutherglen bug.
276. MORGAN, C. N. 635.52
Lettuce-growing.
Qd agric. J., 1946, 63: 9-17.
The introduction of the Imperial strains of lettuce has done much to establish the industry in Queensland. They have shown considerable disease resistance and have stood up to the varying climatic conditions much better than the older varieties. Under certain conditions lettuce can be grown all the year round in Queensland, the chief factors in the warmer months being reliable and constant irrigation and the use of a suitable variety. Imperial 847 is the most popular variety; it can be grown in most localities all the year round. Notes are given on manures and fertilizers, rotation, soil preparation, planting, thinning, cultivation, irrigation, harvesting and varieties. When planting direct into the field it is essential to have the land as level as possible and this can be brought about by the use of a float, which is described and figured. Practically all lettuce are irrigated by overhead sprays. If the ground is fairly dry it is advisable to water well a few days prior to sowing. After sowing, the ground should again be watered and then kept moist until the plants are through. Saturation of soils is undesirable and should be carefully avoided. This condition often occurs during the rainy periods, and irrigation must be carefully planned so as to avoid watering heavily when heavy rain is expected.
277. FARISH, L. R. 635.52
Lettuce production under Mississippi conditions.
Circ. Miss. agric. Exp. Stat. 107, 1942, pp. 8, bibl. 8.
If certain practices are followed and suitable varieties are grown, high quality head lettuce can be produced in Mississippi. Recommendations are made on varieties, time of planting, cultivations, harvesting and marketing. The double row system of planting is preferred.
278. WASHINGTON, K. 635.52: 547.25.77
Molybdenum as a factor in the nutrition of lettuce.
Ann. appl. Biol., 1946, 3: 249-54.
The addition of 0.1 p.p.m. of molybdenum to a nutrient solution in which lettuce was grown had such a marked beneficial effect on both yield and appearance as to suggest that this element was essential for healthy growth.
279. GARMAN, H. R., AND BARTON, L. V. 635.52: 631.531.17
Response of lettuce seeds to thiourea treatments as affected by variety and age.
Contr. Boyce Thompson Inst., 1946, 14: 229-41.
Four varieties of lettuce seeds which were soaked in 0.5% and 1.0% thiourea solutions and germinated immediately after treatment showed a gradual increase in germination with the lengthening of the period of dry storage between

harvest and treatment. Pre-soaking seeds in a 0.5% or 1.0% thiourea solution for 16 hours at 20° C. resulted in greatest stimulation of germination at 30° C. Soaking at 20° C. was more effective than soaking at 30° C. when seeds were germinated at 30° C. Seeds soaked at 30° C. germinated best when treated with 1.0% thiourea solution. Seeds soaked in tap water at 5° C. for 48 hours and placed at 30° C. immediately germinated almost as well as thiourea-treated seeds. [From authors' summary.]

280. ANDERSEN, E. M. 635.52: 632.1/2
Tipburn of lettuce. Effect of maturity, air and soil temperature and soil moisture tension.
Bull. Cornell agric. Exp. Stat. 829, 1946, pp. 14, bibl. 22.

As has been commonly observed, tipburn of lettuce was more severe in heads approaching or of marketable size than in those less mature. The results of these studies indicate that water deficiency is the primary cause of the trouble, although it must not be excluded that the physiological conditions of the succulent tissues associated with reduced soil moisture may possibly be produced by other environmental factors also. Since water availability decreases with decreasing temperature, it is obvious that symptoms were more pronounced when the soil temperature was low. Tipburn was most severe when the difference between air and soil temperature was great, e.g. when a cool, moist period was followed by a sunny, dry period. A highly significant correlation between maximum air and maximum soil temperature was found to exist.

281. LO, T-Y., AND CHEN, S-M. 631.811.9: 635.52
The effect of chemicals and growth on the vitamin C and P contents of Chinese lettuce [*Lactuca scariola* L.]. [Chinese, English summary 8 lines.]
Chinese J. Nutr., 1946, 1: 5-10, bibl. 11.

In field experiments conducted by the Department of Agricultural Chemistry, National Chekiang University, Meitan, Kweichow, the application to the soil of zinc and nickel compounds resulted in increased C and P vitamin content in Chinese lettuce plants. Although, in general, the older leaves were higher in vitamin C than the younger, it was not possible to establish any correlation between degree of development and vitamin P content.

282. LO, T-Y., AND CHEN, S-M. 631.811.9: 635.52
Further experiments on the effects of certain chemicals in promoting the vitamin C and P contents of vegetables. [Chinese, English summary 11 lines.]
Chinese J. Nutr., 1946, 1: 29-34, bibl. 5.

Further experiments [see previous abstract] confirmed the earlier finding that the addition of sulphates of nickel and zinc to farm manure and to rape-seed cake resulted in increased production of the vitamin C and P content in Chinese lettuce plants.

283. TOWNSEND, G. R., EMERSON, R. A., AND NEW-HALL, A. G. 635.53-2.4
Resistance to *Cercospora apii* Fres. in celery (*Apium graveolens* var. *dulce*).
Phytopathology, 1946, 36: 980-2.

As a result of crossing resistant Turkish varieties with a Cornell strain, varieties of celery have been raised resistant to early blight. The quality of several of the selections is high; they have very heavy, crisp petioles, and are not stringy. The new celeries have an unusual flavour which is delicious in mixed salads.

284. THOMPSON, R. C. 635.55: 631.531
Germination of endive seed (*Cichorium endivia*) at high temperature stimulated by thiourea and by water treatments.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 323-6, bibl. 3.

Endive seed treated with a 0.5% solution of thiourea for 4, 8, 16 and 24 hours at 18° and 25° C. and then dried,

showed very significant increases in germination when this took place at 30° to 31° C. after 10 days in store at 18° to 25° C. Treatment with water was almost as effective as that with thiourea. Whether using thiourea or water, the 8-hour treatment at 18° C. gave the highest germination percentages and at this optimum condition of treatment water and thiourea were equally effective. The 18 strains tested varied from 5% to 85% in their ability to germinate at a temperature of 30° C. without treatment. The strains that germinated badly without treatment gave much the best response to thiourea.

285. NUGENT, T. J. 635.61: 632.4
Texas Resistant No. 1 Cantaloupe.
Market Grs. J., 1946, 75: 10: 13.

The Texas Resistant No. 1 is a progeny of a cross between New Seed Breeders (a variety of the Hale's Best type) and an inbred strain of green-fleshed Rocky Dew of West Indian origin. The commercial qualities were obtained from the New Seed Breeders while downy mildew and aphid resistance were acquired from the Rocky Dew inbred. When harvested at three-quarter to full slip stage the melon is of high quality for shipping. It was found to have considerable resistance to mildew. It was slightly to moderately damaged by the mildew and continued to produce a crop, while commercial varieties susceptible to this disease were severely damaged and in many instances failed to produce any good fruit. In one field where this cantaloupe and a variety susceptible to aphids were grown side by side, it showed no injury while the susceptible variety was killed by aphids early in the season.

286. McLEAN, D. M. 635.61
Resistance of Michigan Honey Rock No. 55 to *Fusarium* wilt: a progress report.
Quart. Bull. Mich. agric. Exp. Stat., 1946, 29: 137-46.

Musk melon Michigan Honey Rock No. 55 shows upwards from 75% resistance on infested soils and promise of other excellent commercial qualities.

287. RAHN, E. M. 635.61: 631.8
The influence of rainfall on the response of cantaloupes to manures and commercial fertilizers.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 343-6.

In dry years organic fertilizers were necessary, in wet mineral fertilizers sufficed.

288. SMITH, M. A. 635.61: 632.3
Bacterial spot of honeydew melon.
Phytopathology, 1946, 36: 943-9, bibl. 8.

A hitherto unreported bacterial disease of honeydew melons (*Cucumis melo* L. var. *inodorus* Naud.) causes sunken water-soaked spots on the fruit. Cultural and pathogenicity studies suggest that the causal organism is identical with *Pseudomonas lachrymans*.

289. HERINGA-WESTERHOP, A. C. 635.63: 632.4
Het vruchtvuur in de komkommers veroorzaakt door *Cladosporium cucumerinum* Ellis et Arthur en zijn bestrijding. (Cucumber gummosis and its control.) [English summary.]
Tijdschr. PLZiekt., 1946, 52: 138-49, bibl. 16.

Though cucumber gummosis can cause considerable damage, measures to control it are seldom adopted. Experiments have shown that the disease never attacks old fruits or the foot of younger ones. Control measures mentioned by previous workers include (1) ventilating and heating frames or glasshouses to reduce humidity, (2) spraying with chemicals containing mercury or with salicylanilide (Shirlan), and (3) sterilization of soil and frames with formalin. Dusting with Bulbosan gave good results. It prevented infection but could not prevent the extension of infection already initiated.

290. JENKINS, M. 635.63: 632.4

Breeding mildew-resistant cucumbers.*Market Grs' J.*, 1946, 75: 10: 15, 25.

During work carried out in S. Carolina, it was found that all the standard commercial varieties, without exception, were susceptible to mildew but that some varieties from India and China were resistant in varying degrees. A variety which had been obtained from the Puerto Rico experiment station, Puerto Rico No. 37, was highly resistant; crosses were made between it and Colorado, a good commercial variety. A number of lines were obtained which were as resistant as the resistant parent and produced good yields of attractive, well-shaped fruits. The future value of resistant varieties to commercial growers in areas where downy mildew is prevalent is that (1) the total yield of cucumbers will be increased, (2) the harvest season will be extended, (3) the cost of production will be materially reduced, (4) the percentage of fancy cucumbers will be increased and the percentage of culls will decrease.

291. GORLENKO, M. V., AND VORONKEVICH, I. V. 635.63: 632.3

The cycle of development of the agent of the bacteriosis of cucumbers, *Bacterium lachrymans* Sm. et Bryan under natural conditions.

C.R. Acad. Sci. U.R.S.S., 1946, 51: 641-4.

The experiments described show that cucumber seeds are a source of infection, the organism causing cucumber bacteriosis surviving in lesions on the seed. Treating the seed with formalin was unsuccessful, but good results were obtained with a preparation containing ethyl-mercury phosphate. Recommendations for controlling the disease thus include seed disinfection. Digging-in diseased leaves to guarantee a rapid decay of diseased parts is also said to reduce chances of infection.

292. MAY, A. W. S. 632.6/7: 635.63 + 635.65

Pests of cucurbit crops.*Qd agric. J.*, 1946, 62: 137-50.

A key for identification is given for the following. Foliage and flower pests, banded pumpkin beetle (*Ceratia hilaris* Bd.), plain pumpkin beetle (*Rhapidopalpa abdominalis* Fabr.), leaf-eating ladybird (*Epilachna 28 punctata* Fabr.), melon aphid (*Aphis gossypii* Glov.), onion thrips (*Thrips tabaci* Lind.), red spider (*Tetranychus urticae* Koch) and cucumber moth (*Phacellura indica* Saund.). Stem and fruit pests, cucurbit stem borer (*Apomecyna histrio* Fabr.), green vegetable bug (*Nezara viridula* L.), cucurbit shield bug (*Megymenum insulare* Wwd.), black passion bug (*Leptoglossus bidentatus* Montr.) and cucumber fly (*Austrodacus cucumis* Fr.). Their life-histories and habits are described and measures for their control are given. As a general routine against pests and fungal diseases the recommendations are: Soon after the seedlings appear above the ground dust weekly with a mixture containing 5 parts of arsenate of lead, 3 parts of copper carbonate, 6 parts of sulphur and 6 parts of kaolin. The copper fungicide must be included in dusts and sprays applied to rock melons and cucumbers, both of which are very susceptible to downy mildew, but they may be omitted in other cucurbit crops. If aphids or thrips appear in the crop they may be checked with a 3% nicotine dust or a nicotine spray ($\frac{1}{2}$ pint nicotine sulphate, 2 lb. soap, and 50 gal. water).

293. FARISH, L. R., MOORE, E. L., AND CURREY, E. A. 635.64

Tomato production in Mississippi.*Bull. Miss. agric. Exp. Stat.* 399, 1944, pp. 20, bibl. 12.

Plants for the early tomato crop are set in the field just as soon as it appears that the danger of frost is over. It is better to set them in a settled seedbed. Fall tomatoes should be set in the field in central Mississippi during the first half of July. Close spacings for pruned and staked tomatoes produce higher total yields and much higher early

yields. If pruned to one stem, they should be spaced 18 inches or closer in the row. Two stems per plant are more profitable in Mississippi than one stem per plant, and they should be spaced from 18 to 24 inches in the row when pruned to two stems and staked. Fall tomatoes usually do better if left on the ground than if pruned and staked. They can stand the hot dry weather better on the ground. [From authors' summary.]

294. VALLANCE, L. G. 635.64

The soil and cultural requirements of the tomato.*Qd agric. J.*, 1946, 62: 261-70.

Various aspects of tomato culture are discussed in relation to tomato growing in Queensland, where commercial production is carried out on both forest and scrub soils, the textures of which may vary from very sandy soils to sandy loams, loams, clayey loams or light clays. In general the sandy loams and loams are preferable to those which are markedly sandy or clayey. Sandy soils which contain considerable amounts of organic matter, and are dark coloured and somewhat peaty in nature, are usually excellent all-season tomato soils. The ideal site of a farm for tomato growing is one with a north to north-easterly aspect, protected from heavy wind, well drained and above frost level. Considerable mechanical damage may be caused by heavy winds which also, by injuring the flowers, have an adverse effect upon fruit setting; this may be obviated by a series of windbreaks made by growing rows of cow cane across the farm or on the headlands. The importance of organic matter in the soil is emphasized and a list of plants suitable for cover cropping is given, the Poona pea being specially mentioned. The use of farmyard manures, of lime and of dolomite is described.

295. MORGAN, C. N. 635.64

Soil preparations and transplanting of tomatoes.*Qd agric. J.*, 1946, 62: 328-44.

Tomato culture in Queensland is described in relation to the preparation of the soil, transplanting, planting systems and pruning, ground crops, irrigation, cultivation, "buck" plants, and sowing seeds. In Queensland more tomatoes are grown as ground crops than by any other method, particularly in areas where there is no irrigation and ample ground is available. It is only in the Redlands and metropolitan areas where trellising or staking is practised extensively. The three training methods—cradle, trellising and staking—are described and illustrated. Two methods of irrigation, furrow and overhead, are used; it is emphasized that excessive watering by either method is harmful. In a number of varieties "buck" plants occur. When young these plants are sturdier, shorter and have more laterals than normal plants; but they do not crop satisfactorily and bear small numbers of misshapen fruit.

296. SUSAKJAN, N. M., AND OTHERS. 635.64: 631.541: 581.192

Biochemical changes in tomatoes induced by grafting. [Russian, English summary.]

Biochimija, 1946, 2: 105-18, bibl. 7.

Analyses of tomato fruits of the second and fourth generations from plants obtained by grafting has shown that the activity of peroxidase is influenced by the rootstock, whereas polyphenolase activity and total acidity are influenced by the scion. Definite biochemical changes underlie the morphological changes which are produced in the progeny by grafting the parent plant.

297. BEST, R. J. 635.64: 632.8

Thermal inactivation of tomato spotted wilt virus.*Reprinted from Aust. J. exp. Biol. med. Sci.*, 1946, 24: 21-5, bibl. 5.

The thermal death point of tomato spotted wilt virus was determined as 45° C. After 24 hours' exposure to an air temperature of 40° C. the greater part of the virus was found to be inactivated, but inactivation was not complete.

Observations indicate that in hot weather considerable inactivation of the virus occurs in field plants; however, the surviving virus in the cooler underground portions will carry the infection over into the cooler weather.

298. DELLE COSTE, A. C., AND ZABALA, S. 632.64: 635.64 + 633.71

La peste negra del tomate o "corcovo" del tabaco en la Republica Argentina. (Tomato spotted wilt or tobacco ring spot in Argentina.) *Publ. Inst. Sanid. veg. Buenos Aires*, 1946, Año 2, Ser. A, No. 17, 23 pp., bibl. 64.

The symptoms of tomato spotted wilt and tobacco ring spot, the properties of the virus causing them and its transmission, are described. A list is given of 31 plants yielding positive results from inoculations with the virus, with the resulting symptoms in each case, and another list indicates plants on which the results were negative.

299. FOSTER, R. E. 635.64: 632.48

The first symptoms of tomato *Fusarium* wilt: clearing of the ultimate veinlets in the leaf. *Phytopathology*, 1946, 36: 691-4, bibl. 6.

The first symptom of the *Fusarium* wilt disease (*F. oxysporum* f. *lycopersici*) of tomatoes is a clearing of the ultimate veinlets in the leaflets of infected plants, giving them a "netted" appearance. Veinlet clearing appeared on many plants 24 hours after dip-inoculation. Most often it is first evident in the terminal leaflet of the third leaf, after 36 hours appearing in the second and fourth leaves and later in all the leaves. Very early symptoms of tomato *Fusarium* wilt are of little importance in studying the disease in the field, but they have been of considerable value in various controlled studies in the greenhouse and laboratory. The appearance of a disease-induced effect in the upper portion of a plant only 24 hours after root inoculation indicates that toxin is produced at the time of fungus penetration or very shortly afterwards.

300. ABERDEEN, J. E. C. 635.64: 632.952
Notes on fungicides for the control of tomato foliage and fruit diseases. *Qd agric. J.*, 1946, 62: 274-7.

These notes summarize results of experiments carried out by the Queensland Department of Agriculture and one by the Department of Agriculture for New South Wales. The following recommendations are made: (1) If the grower anticipates a heavy infection of target spot (early blight) then a wet spray should be used. (2) If a wet spray is to be used and the grower desires to mix his own, then home-made cuprous oxide is recommended. (3) If requiring a commercial spray, then the copper oxychloride product is the best of those available at present. (4) If the grower decides that a dust is required, then copper carbonate-kaolin mixtures are recommended.

301. PEAY, W. E. 635.64: 632.78

Tomato fruitworm control.

Market Grs' J., 1946, 75: 8: 15, 34, 41.

The damage caused by the tomato fruitworm [*Heliothis armigera*] and the habits of the pest are described. Strong evidence indicates that there are three generations. The first brood of worms reaches a peak in July, a second in August, and a third in late September or early October. The moths emerge in spring and lay their eggs in masses. This accounts for the spotted infestations usually encountered in the field. When spotted outbreaks occur the worms can be controlled by dusting the infested spots with undiluted calcium arsenate or with cryolite dust. When the infestation is general throughout the field the entire field should be dusted.

302. HARDENBURG, E. V. 635.65

Experiments with field beans.

Bull. Cornell agric. Exp. Stat. 776, 1942, pp. 28.

The bulletin presents the results of various experiments with field beans conducted during the period 1925-1940, throwing

light on the following, among other, points: (1) Seed beans stored at room temperature and at relatively low humidity maintained a viability of over 90% for 4 years; however, if seed is used after more than one year's storage, it should be tested for germination. (2) Origin and size of seed were found to have no influence on yield. (3) Seed inoculation increased neither yield nor root nodulation. (4) From fertilizer experiments it is concluded that applications of 200-300 lb. per acre of a 6-18-6 or a 4-12-4 mixture are profitable where beans follow another cultivated crop. (5) A 57-6% higher yield was obtained by using the bean planter as equipment for seeding and fertilizing as compared with the grain drill. (6) For Red Kidney and French White Kidney a spacing of 6 plants to the foot in drills is recommended, while with Perry Marrow 6 plants to the foot in hills 12 in. apart gave the highest yield. The Robust Pea variety was found to favour a spacing of 4 plants to the foot. (7) Scraping the soil for the purpose of weed control proved as good as 6 cultivations. (8) In variety trials the new French White Kidney outyielded the older type of varieties every year, but as the demand for it is confined to a specialized trade, it will hardly replace the older types.

303. LÖHNIS, M. P. 635.65: 632.19
Een voedingsziekte in bonen (Phaseolus). Voorlopige mededeling. (A nutritional disease of kidney beans. Preliminary report.) [English summary.] *Tijdschr. Plziekt.*, 1946, 52: 157-60.

Injury to kidney bean plants has been observed on experimental plots supplied with little or no marl whilst plots with abundant marl bore healthy crops. Similar symptoms appeared on plants that had received ammonium sulphate whilst plots treated with Chilean nitrate produced healthy plants. Potatoes and strawberries grown along with the affected beans showed no damage. The leaves of affected plants show chlorosis between the veins; older leaves may curl and bear small necrotic spots between the veins. Small brownish purple spots may occur on petioles and stems and growth is retarded. The root system is poorly developed but without any definite lesions. The disorder appears to be due to the toxic action of manganese, for affected foliage has a much higher manganese content than healthy foliage.

304. WITTWER, S. H., AND MURNEEK, A. E. 635.65: 577.17
Further investigations on the value of "Hormone" sprays and dusts for green bush snap beans. *Proc. Amer. Soc. hort. Sci.* for 1946, 1946, 47: 285-94, bibl. 10.

In experiments at Columbia, Mo., among blossom sprays or dusts used on snapbeans, para-chlorophenoxyacetic acid was the most promising for yield increase. Other related and effective substances were 2,4-dichlorophenoxyacetic acid and α -ortho-chlorophenoxypropionic acid. Studies indicated that they are unlikely to be effective on peas, lima beans or dry shell beans, since the hormone effect, while stimulating ovarian tissue growth, has been observed generally to depress rather than stimulate seed formation and growth.

305. FISHER, E. A., RIKER, A. J., AND ALLEN, T. C. 635.65: 577.17
Bud, blossom, and pod drop of canning string beans reduced by plant hormones. *Phytopathology*, 1946, 36: 504-23, bibl. 11.

Bud, blossom and small pod drop of canning beans has reduced the yield in Wisconsin during hot weather and following attacks by various insects, especially *Lygus oblineatus*. Various hormones were tried to prevent the formation of abscission layers and so obviate the loss by pod drop. Among the hormones tried, α -naphthalene-acetic acid and 2,4-dichlorophenoxyacetic acid were the most promising against abscission layer formation. When used too strong these hormones not only prevented the formation of abscission layers but also induced vein clearing

distortion, and dwarfing of leaflets, which might be confused with virus symptoms. Damage by *Lygus oblineatus* in greenhouse tests was prevented by dusting with α -naphthaleneacetic acid. Promising results with the dust were obtained in field trials.

306. BAKER, K. F., SNYDER, W. C., AND HOLLAND, A. H. 635.653

Lygus bug injury of lima bean in California.

Phytopathology, 1946, 36: 493-503, bibl. 30.

Large and baby lima beans grown in California for dry food, seed, the fresh market, and freezing commonly have a necrotic pitting of the seed which closely resembles the yeast spot disease. Tests with *Lygus* bugs (*L. hesperus*, *L. elisus*) have shown that the pits result from toxic feeding of the insects on the developing pods. The insects cause a shedding of blossoms and of pods up to 2 inches long. Reduction of *Lygus* injury by one application of DDT resulted in significant increases in number of green and dry pods, number and weight of beans, and percentage of unpitted seeds.

307. VAN ROSSEM, G. 635.65: 632.76

Het voorkomen van den boonkenver, *Acanthoscelides obtectus* Say (Col., Bruchidae) te Heerlen (L.). (The bean weevil in the Southern Netherlands.)

Tijdschr. PlZiekt., 1946, 52: 85-9, bibl. 9.

Outbreaks of the bean weevil in the Dutch province of Limburg are described. So far as the author is aware, this is the first time that this pest has been found in the open field in Holland.

308. ANON. 635.65: 632.77

The bean fly (*Agromyza phaseoli*).

Agric. Gaz. N.S.W., 1946, 57: 137-8.

The bean fly, which is mainly a coastal pest in New South Wales, infests all varieties of climbing or bush types of edible beans of the genus *Phaseolus*. The following spray is recommended for the control of this pest: nicotine sulphate 1 fluid oz., white oil emulsion $6\frac{1}{2}$ fluid oz., water 4 gallons. It is important that the first application be made when the first plants which show through the ground in any particular sowing are not more than three days old. Only the upper surfaces of the leaves should be sprayed, and 40 gallons of spray mixture is usually more than sufficient to spray an acre once.

309. VAYSSIERE, P., AND LEPESME, P. 632.76: 635.65

Sur quelques bruchides nuisibles. (Some harmful Bruchidae.)

Reprinted from Rev. franç. Ent., 1941, 8: 198-202.

Some species of Bruchidae are briefly discussed as pests of beans and peas, and a species found on beans from Madagascar is described as *Spermophagus dorsopictus* n.sp. (Lepesme).

310. HOLMBERG, S. A. 635.655: 631.523

Från sojväxäktförädlingen vid Fiskeby. (Soybean breeding at Fiskeby, Sweden.) [English summary $\frac{1}{2}$ p.]

Reprint from Lantbr. Akad. Tidskr., 1946, 35: 373-84.

Breeders at Fiskeby aimed at producing a soybean variety that would ripen under Swedish conditions. They eventually succeeded by crossing extra-early varieties found on the islands of Hokkaido and Sachalin with medium-early varieties from Manchuria and Germany. Many of the resulting hybrids were found to ripen in the first days of September, thus showing an advance in earliness of 2-3 weeks in comparison with the so-called extra-early varieties grown before. The work continues in order to improve yield and quality of the new productions.

311. ROBBINS, W. A., AND PORTER, R. H. 635.655: 631.531.17

Germinability of sorghum and soybean seed exposed to low temperatures.

J. Amer. Soc. Agron., 1946, 38: 905-13, bibl. 9.

Immature seed of sorghum and soybeans was reduced in

viability by exposure to low temperatures. The reduction in vitality at a certain moisture content increased as the temperature decreased. As the moisture content decreased the reduction in viability from exposure to any certain temperature decreased also. Soybean seed in small lots with a moisture content of 30% to 32% or less was not reduced in viability by freezing for 10 hours at -20° F. At 20° F. no injury occurred to seed of most varieties with a moisture content of 50% to 60%. Soybean seed may contain a much higher percentage of moisture than sorghum seed without being injured by exposure to freezing temperatures. [From authors' summary.]

312. PINCK, L. A., ALLISON, F. E., AND GADDY, V. L. 635.655: 631.87

The effect of straw and nitrogen on the yield and quantity of nitrogen fixed by soybeans.

J. Amer. Soc. Agron., 1946, 38: 421-31.

Greenhouse experiments showed that: Straw significantly decreased the yields of inoculated soybeans whether added at the time of planting or 6 weeks earlier. Additions of urea produced significant increases in the yields of soybeans but had little effect upon the total nitrogen content, provided the light was adequate for a high rate of nitrogen fixation. Where straw-nitrogen mixtures were applied to the soil under high light conditions, the yields and nitrogen contents of the plants were slightly higher if planting was done immediately rather than 6 weeks later. A single crop of soybeans fixed up to 165 pounds of nitrogen per acre. The experiments emphasize the desirability of utilizing carbonaceous crop residues in a legume cropping system, wherever feasible, rather than in a non-legume commercial nitrogen system.

313. WILSON, J. K. 635.655: 581.523.4

The symbiotic performance of isolates from soybean with species of *Crotalaria* and certain other plants.

Mem. Cornell agric. Exp. Stat. 267, 1945, pp. 20, bibl. 34.

In a study of the symbiotic performance of 12 isolates from soybeans with 21 species of *Crotalaria* and certain other plants, evidence was obtained that isolates from the soybean can effect nodulation on many species of legumes, and that there is no specific strain of bacterium which produces nodulation in soybean.

314. KRAMER, A. 635.656 + 635.653

Relation of maturity to yield and quality of raw and canned peas, corn and lima beans.

Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 361-7, bibl. 5.

As a result of trials at College Park, Maryland, it is recommended that yield data for products such as peas and lima beans, which are harvested immature, should be accompanied by a reliable index of maturity such as is afforded by a tenderometer, or alcohol-insoluble solids content, so that they may be satisfactorily interpreted.

315. APPLEMAN, M. D., AND SEARS, O. H. 632.951: 631.847

Effect of DDT upon nodulation of legumes.

J. Amer. Soc. Agron., 1946, 38: 545-50.

The experiments described were carried out in a greenhouse, with two preparations of DDT, one a technically pure compound which contained approximately 98% DDT and the other Neocid A10, which contained 10% DDT in pyrophyllite. The plants used were soybeans, peas, red clover, sweet clover and lespedeza. DDT at 10% showed no inhibitory effect on the height of the legumes in sand until the concentration reached 1,000 pounds an acre. Plants grown in soil did not develop symptoms of injury to the same degree as those grown in the sand. Nodulation was adversely affected almost as much in the soil as in the sand. In no case were unfavourable results obtained in soil when treatment with DDT did not exceed 100 pounds an acre.

316. MACGILLIVRAY, J. H., AND OTHERS. 635.67
California sweet-corn suckering studies.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
378-82, bibl. 4.
According to tests conducted on irrigated sweet corn, over a period of 4 years and in 7 counties [of California], neither the yield, nor the number of ears per plant, nor the ear size is improved by suckering. Therefore, suckering appears to be an unjustified practice that adds considerably to the cost of production without gaining a commensurate return to the grower. [Authors' summary.]
317. HARPER, R. E. 635.67
USDA-34—A tropical sweet corn.
Agric. Amer., 1946, 6: 74-5.
The sweet corn variety USDA-34 was raised at the Federal Experiment Station at Mayaguez, Puerto Rico. It proved to be a high yielding variety with large ears and long kernels, and was therefore selected for increased production and distribution. It is a vigorous, tall variety, averaging 8 or 9 feet high and somewhat resembling the tropical varieties of field corn. It is highly resistant to yellow stripe mosaic disease, *Helminthosporium* leaf spot, and Stewart's disease (*Bacterium stewartii* E. F. Sm.) of corn, and is somewhat resistant to damage by the corn earworm (*Heliothis armigera* Hbn.) because the ear develops a tight shuck which grows well beyond the tips. The Station has continued to improve the variety by selection for disease resistance, uniformity, and kernel tenderness.
318. ESSELEN, W. B., Jr., AND FELLERS, C. R. 635.8
Mushrooms for food and flavor.
Bull. Mass. agric. Exp. Stat. 434, 1946, pp. 11,
bibl. 24.
Data taken from the recent literature have been collected by the authors to prove the nutritional value of mushrooms. They contain 2-67% protein of the fresh weight and all essential amino acids and are a source of iron, copper, certain B vitamins, riboflavin, nicotinic acid and pantothenic acid. The vitamins are retained during processing. Detailed figures are tabulated.
319. ANON. 635.8
Cultivo del hongo de cama, champignon de couche *Agaricus (Psalliota) campestris*. Su comercialización e industrialización. (The cultivation of the mushroom and the mushroom industry.)
Bol. Frut. Hort. Flor. Buenos Aires, 1945, No. 89,
45 pp. (mimeographed).
This is a general guide to the cultivation of the common mushroom. It begins with a short introduction and then there are two tables showing the quantities of edible fungi, dried and preserved in containers, imported into Argentina from other countries. It continues with an account of the common mushroom and its cultivation, including construction of buildings and preparation of beds, and methods of preservation, and ends with a long tabulated list of the troubles that might arise in the mushroom beds, their causes and remedies.
320. ASHLEY, T. E. 635.64
a Tomato varieties: Poplarville, 1944.
Inform. Sheet Miss. agric. Exp. Stat. 322, 1944,
p. 1.
b ASHLEY, T. E. 635.64
Tomato variety test, Poplarville, 1944-45.
Inform. Sheet Miss. agric. Exp. Stat. 358, 1945,
p. 1.
c BARNES, E. C., CLAYTON, C. N., AND JENKINS,
J. M., Jr. 635.63: 631.523
The development of downy mildew-resistant cucumbers.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
357-60, bibl. 4.
By breeding at Charleston, S. Carolina.
- d BEST, R. J. 633.71-2.8
On the rate of inactivation of tobacco mosaic virus by potassium salicylate.
Aust. J. exp. Biol. med. Sci., 1945, 23: 221-6,
bibl. 8.
- e BEST, R. J. 635.64: 632.8
Inactivation of tomato spotted wilt virus by salicylate.
Reprint from *Aust. J. exp. Biol. med. Sci.*, 1946,
24: 27-31, bibl. 6.
- f CAMPBELL, J. A., MOORE, E. L., AND FOSTER, H. H. 635.656
English pea variety trials, Crystal Springs, Miss.
Inform. Sheet Miss. agric. Exp. Stat. 359, 1945,
p. 1.
- g FARISH, L. R. 635.64
Tomato variety test, Delta Station, 1943-44.
Service Sheet Miss. agric. Exp. Stat. 385, 1945,
p. 1.
- h FOSTER, H. H., AND PINCKARD, J. A. 635.34: 632.4
Cabbage varieties tested for resistance to mildew or rust.
Inform. Sheet Miss. agric. Exp. Stat. 326, 1944,
pp. 2.
- i FRANÇOIS, L. 633.8
Semences et premières phases du développement des plantes commensales des végétaux cultivés. (Weeds of cultivated plants, their seeds and early growth stages.)
Monographies publiées par les stations et laboratoires de recherches agronomiques, Paris, Imprimerie Nationale, 1943, pp. 183, bibl. 95.
This monograph is abundantly illustrated
- j FULLER, W. H., NORMAN, A. G., AND WILSIE, C. P. 633.522-1.56
The retting of hemp. I. Field retting of hemp in Iowa.
Res. Bull. Iowa agric. Exp. Stat. 342, 1946,
pp. 832-91.
- k FULLER, W. H., AND NORMAN, A. G. 633.522-1.56
The retting of hemp. II. Controlled retting of hemp.
Res. Bull. Iowa agric. Exp. Stat. 343, 1946,
pp. 894-924, bibl. 15.
- l FULLER, W. H., AND NORMAN, A. G. 633.522-1.56
The retting of hemp. III. Biochemical changes accompanying retting of hemp.
Res. Bull. Iowa agric. Exp. Stat. 344, 1946,
pp. 927-44, bibl. 9.
- m GERSTEL, D. U. 633.71
Inheritance in *Nicotiana tabacum*. XVII. Cytogenetical analysis of glutinosa-type resistance to mosaic disease.
Genetics, 1943, 28: 533-6, bibl. 5.
- n GÜLTEKIN, K. 577.17: 633.71
Sigara ve tütün harmanlarında kimyanın rolü. (The role of chemistry in blending tobacco.) [Translation in French.]
İnhisarlar Tütün İnst. Rap., İstanbul, 1938, 2: 1: 12-15. [Received 1946.]
- o GUSTAFSON, A. F. 633(74.7)
Soil and field-crop management for Northwestern New York.
Bull. Cornell agric. Exp. Stat. 777, 1942, pp. 32, bibl. 32.
Bean, onion, lettuce and cabbage crops included.

- p LUGG, J. W. H., AND BEST, R. J. 633.71-2.8
The effects of infection of tobacco plants (*Nicotiana tabacum*) with tobacco mosaic virus on some of the properties of the protein present in the leaves.
Aust. J. exp. Biol. med. Sci., 1945, 23: 235-9, bibl. 10.
- q ORBAY, R. 633.71-1.462
Akhisar 1937-8 hastalıklarıyla mücadele ve örnek fidelikleri. (Soil disinfection for tobacco.) [French summary].
Inhisarlar Tütün Inst. Rap., İstanbul, 1938, 2: 1: 65-80, bibl. 7. [Received 1946.]
- r PLATENIUS, H. 635.1/7: 631.564
Problems of packaging vegetables for Upstate New York markets.
Bull. Cornell agric. Exp. Stat. 779, 1942, pp. 19.
- s PRYOR, D. E., WHITAKER, T. W., AND DAVIS, G. N. 635.61: 631.523
The development of powdery mildew resistant cantaloupes [by breeding].
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 347-56, bibl. 9.
- t RIESER, A. 633.71
Nikotinisiz Türk tütünleri meselesi. (On nicotine-free Turkish tobacco.) [Translation in German].
Inhisarlar Tütün Inst. Rap., İstanbul, 1937, 1: 2: 91-6. [Received 1946.]
- u SHAFER, J., Jr., AND SAYRE, C. B. 635.34: 632.19: 631.84
Internal breakdown of cabbage, as related to nitrogen fertilizer and yield.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 340-2.
Excessive nitrogen the cause.
- v SPARKS, W. C., AND BINKLEY, A. M. 635.25: 631.531
Natural crossing in Sweet Spanish onions as related to distance and direction.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 320-2, bibl. 2.
- w TING, C. L. 635.655
Genetic studies on the wild and cultivated soybeans.
J. Amer. Soc. Agron., 1946, 38: 381-93, bibl. 7.
- x TOMUR, K., AND ORBAY, R. 633.71-1.462
Tütün fide toprağının ilaçlanması (Desinfection) meselesi ve bunun üzerinde yapılan denemeler. (The disinfection of the soil in Turkish tobacco growing.) [German summary].
Inhisarlar Tütün Inst. Rap., İstanbul, 1937, 1: 2: 107-18. [Received 1946.]
- y TOMUR, K. 633.71-2.19
Sigaralarda görülen muhtelif lekeler hakkında bir müşahade. (Flecking on cigarettes.) [Summary in German].
Inhisarlar Tütün Inst. Rap., İstanbul, 1938, 2: 1: 59-63. [Received 1946.]
- ### FLOWERS AND ORNAMENTALS.
321. WEINARD, F. F., AND KAMP, J. R. 639.936.69
Experiments with carnations [at Urbana, Ill.].
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 509-10, bibl. 3.
One-year trials on the following problems: (1) Yield in relation to number of shoots at planting. (2) Productiveness on new and old soils. (3) Result of propagation from "mosaic-free" stock plants.
322. BICKERTON, J. M. 632.48: 635.936.69
Alternaria blight of carnations caused by *Alternaria dianthi* Stev. and Hall.
Bull. Cornell agric. Exp. Stat. 790, 1943, pp. 29, bibl. 29.
In view of the heavy losses suffered by New York carnation growers from *alternaria* blight an investigation over a period of 4 years has been devoted to the study of *Alternaria dianthi*. The following extract from the author's summary gives the principal conclusions reached on control measures: "Infested and infected cuttings represent the main source of inoculum for primary and secondary infections in the cutting bench. Similarly, the various chains of secondary lesions in the greenhouse and field are initiated by conidia developing on previous lesions. Experiments failed to demonstrate the ability of the pathogen to overwinter in the field. Water is the most important means of disseminating the conidia. Stomata and wounds represent the infection courts for leaf infections. The amount of infection was shown to increase in proportion to the period of wetting of the leaf surfaces. Plants kept in the greenhouse during the summer remain practically free of infection without the necessity of spraying, and, in a wet season favourable for infection in the field, may produce more than twice as many flowers as those grown in the field. Similarly the severity of the disease on field-grown plants is reduced by benching early. Overhead watering in the greenhouse causes a marked spread of *alternaria* blight. Field-spraying with bordeaux mixture 4-4-50, to which is added an effective spreader such as Penetrol 1-600, or raw linseed oil 1-400, is an efficient and a practical means of appreciably reducing the severity of *alternaria* blight and increasing the production of flowers. Applications should be made either before rains or at ten-day intervals, starting soon after transplanting to the field and continuing until just prior to benching. Additional applications of the fungicide after benching from the field are unnecessary, if the foliage is kept dry."
323. KIPLINGER, D. C., AND FULLER, G. 635.936.69: 632.654.2 + 632.753
Selenium studies with some flowering greenhouse plants.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 451-62, bibl. 10.
Results of tests at Columbus, Ohio, during the last few years show that the use of selenium offers distinct possibilities for the control of red spider and aphids on carnations, chrysanthemums and hydrangeas. Some varieties of chrysanthemum are, however, susceptible to selenium injury and this must be watched. Certain other plants, viz. gardenia and cyclamen, were also found to be susceptible. The trials and methods of application are described.
324. WHITE, H. E., AND WHITCOMB, W. D. 635.936.69: 632.654.2
Sodium selenate for red spider control in Massachusetts.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 503-6.
Sodium selenate proved effective against the red spider. The best dose for carnations appears to be $\frac{1}{2}$ to $\frac{3}{4}$ grain sodium selenate per square foot applied as pure crystals in solution or its equivalent in a proprietary mixture (P40). Treatment becomes effective in 30 days and should remain so for 3 months. It proves to be an economic control method on a commercial scale.
325. POST, K., AND HOWLAND, J. E. 635.937.34: 631.541.11
A comparison of production of greenhouse roses grown on three rootstocks.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 482-4.
A comparison during 3 years at Ithaca of the use of the

commonly used rootstock *Rosa manetti* with that of *Rosa multiflora* or of a special Texas hybrid rose for the greenhouse rose Briarcliff showed no advantage in favour of the two last.

326. HOWLAND, J. E. 635.937.34: 581.11

The rate of photosynthesis of greenhouse roses.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
473-81, bibl. 17.

Net changes in dry weight of rose leaves during the day and at night for the varieties Peter's Briarcliff and Better Times were measured at various times during the year by the twin-leaflet method. Translation of carbohydrates from the test leaves was not prevented. The grand average daily gain due to photosynthesis was 8.3% for Peter's Briarcliff and 9.1% for Better Times. Average daily net gain for 24 hours was 3.9% for both varieties. The twin-leaflet method was well adapted to roses. There was no particular advantage in limiting choice of leaflets to either the upper or lower pair of leaflets in the five-leaflet leaves. [Author's summary.]

327. POST, K., AND HOWLAND, J. E. 635.937.34: 631.84: 581.035

The influence of nitrate level and light intensity on the growth and production of greenhouse roses.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
446-50, bibl. 3.

Three years' study at Cornell showed that maximum economical production occurred each year when the soil nitrate test was held between 25 and 75 p.p.m. The lack of statistical significance in the interaction effect between nitrate tests and months indicates that light intensity controls growth and flower production and that nitrate application cannot overcome this effect. [From authors' summary.]

328. POST, K., AND HOWLAND, J. E. 635.937.34: 631.87

The influence of various soil amendment materials on the growth and flower production of greenhouse roses.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
465-8, bibl. 4.

Notes on the use and results in a silt loam sod soil at Ithaca, N. York, of sphagnum peat, cinders, excelsior, Haydite and composts thereof.

329. SMITH, A. G., Jr. 635.937.34: 632.4

Lime and fertilizers in relation to blackspot of roses.

Bull. Va agric. Exp. Stat. 368, 1945, pp. 10, bibl. 10.

In 1938 a French rose grower, C. Mallerin, claimed that he had obtained control of black spot (*Diplocarpon rosae*) by applying annually specified amounts of NPK in combination with fungicidal treatment. The dosage applied per acre was N=36 lb., P_2O_5 =90 lb., and K_2O =126 lb. In the light of the Virginia experiments, reported in this bulletin and carried out from 1939 to 1941, the amount of potash recommended by Mallerin appears excessive. Varietal resistance to black spot proved to be of greater importance in the control of the disease than high potash applications. It was further found that, within reasonable limits, lime has no material effect on the growth of roses or black spot development, provided the soil has a high organic matter content and is otherwise in good condition.

330. ALEKSANDROV, V. G. 635.939.124: 581.17

The biology of the cell nucleus in plants. The formation of intercellular spaces in the cortex and medulla of *Rhododendron ponticum* L. and *R. caucasicum* Pall. [Russian].
Sovetsk. Bot., 1945, 13: 5: 14-21.

The spaces began to appear as soon as the meristematic stage was passed. Groups of cells began to fill with crystals of calcium oxalate which gradually overwhelmed the nuclei but did not kill the cells. These cells grew in size until

their walls began to collapse and the crystals to decompose. This change was accompanied by a vigorous accumulation of starch in the surrounding parenchyma cells. The former oxalate cells merged into large empty spaces and passages.

331. HOWLAND, J. E. 635.976.32

Some factors affecting flowering of *Daphne cneorum*.

Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
469-72, bibl. 2.

In trials at Cornell it was found possible to force *Daphne* plants at 50° to 55° F. in mid-February to flower in 8 weeks, provided they had previously been "prepared for forcing" by shearing back to within a few inches of the ground in the previous summer. All plants were stored in a refrigerator at 40° F. from 8 December until the date of forcing, this low temperature treatment being the best method of ensuring development of flower buds.

332. RAY, S. 635.937.17: 631.8

Reduction of blindness in hydrangeas.

Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
501-2.

The chief cause is the inadequate accumulation of carbohydrates for the initiation of flower buds. Practical methods of preventing such a condition are here discussed. The adoption of these will result in flowering plants from cuttings, irrespective of whether the cuttings are from blind wood or even from completely blind plants.

333. ANON. 635.965.23: 632.77

The cineraria leaf-miner (*Phytomyza atricornis*).

Agric. Gaz. N.S.W., 1946, 57: 318.

During the late winter and early spring, in most years, the leaf mining larvae of this fly cause damage to cinerarias in the Sydney district. When the plants are heavily infested their growth may be severely retarded or they may be killed, as most of the leaves are completely destroyed. The fly also attacks the leaves of a number of related weeds. It may be controlled by spraying with an insecticide consisting of nicotine sulphate 1 fluid oz., soap 2 oz., water 2½ gal. Spraying should start when the first mines appear in the leaves, and should be repeated at intervals of 10 days.

334. ARK, P. A., AND BARRETT, J. T. 635.979.872: 632.3

A new bacterial leaf spot of greenhouse-grown gardenias.

Phytopathology, 1946, 36: 865-8.

Leaf spot on gardenia in California is caused by a yellow bacterium, for which the name *Phytomonas maculifolium-gardeniae* is proposed. The disease increases in serious proportions under conditions of high humidity and high air temperatures. In controlling the disease it is important to avoid syringing the plants with water. They should be sprayed at frequent intervals with aqueous copper sulphate solution, 1 to 2,000, plus a spreader. [Authors' summary.]

335. HOWLAND, J. E. 635.939.516: 632.19

Foliar dieback of the greenhouse snapdragon *Antirrhinum majus* and a study of the influence of certain environmental factors upon flower production and quality.

Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
485-97, bibl. 8.

Foliar dieback is described. It shows the characteristics of a physiological disease. In the trials which took place in 1943/44 and 1944/45 no one factor of those considered was found responsible for initiating the condition or for influencing the severity of damage. The factors were nitrogen and potassium nutrition, soil reaction (pH), soil type, soil moisture, day length, light intensity and air temperature. Spectrographic analysis indicated that injured leaves contained two or more times the amount of lead, barium, boron, aluminium, strontium and iron present in uninjured leaves.

336. ARK, P. A., AND THOMAS, H. E. 585.94: 632.3
Bacterial leaf spot and bud rot of orchids caused
by *Phytomonas cattleyae*.
Phytopathology, 1946, 36: 695-8, bibl. 7.

A bacterial leaf spot and bud rot of *Cattleya* sp. and *Phalaenopsis* sp. caused considerable damage in orchid houses in Central California. The disease first shows as small, dark, water-soaked spots, which rapidly increase in size, changing from light brown to dark chestnut brown with age. Under favourable conditions of temperature and moisture the infection spreads rapidly and may attack the crown, sometimes killing the plant. Experiments showed that the disease is caused by *Phytomonas cattleyae*, a description of which is given. The disease may be controlled by reducing the air humidity and by swabbing diseased plant parts with 0.1% solution of corrosive sublimate.

337. WHITE, H. E. 635.937.511: 631.535
Fermate and its effect on rooting of geranium cuttings.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 522-4, bibl. 1.

In experiments at Waltham, Mass., the application of Fermate alone to geranium cuttings did not reduce losses from rot diseases in cuttings. But the application of growth substance plus Fermate resulted both in greater percentage of rooting, in better rooting and significant reduction in loss from rots.

338. ARK, P. A., AND TOMPKINS, C. M. 632.3: 583.5
Bacterial leaf blight of bird's nest fern.
Phytopathology, 1946, 36: 758-61.

A bacterial disease of the bird's nest fern, *Asplenium nidus* L., causes serious losses in commercial greenhouses in central California. The causal organism is described and the name *Phytomonas asplenii* n.sp. is proposed. Control measures consist of strict sanitation involving steam-sterilization of the brick-dust and rats-nest (a natural forest compost) media, flats, and pots, the use of sterile forceps in transplanting, and avoidance of excessive watering and too high humidity in the greenhouses.

339. ARK, P. A., AND TOMPKINS, C. M. 635.965.26: 632.651.3
Leaf-nematode infestation of bird's nest fern.
Phytopathology, 1946, 36: 892-3.

The leaf nematode, *Aphelenchoides fragariae*, causes heavy losses to growers and has ruined the crop of bird's nest fern (*Asplenium nidus*) in certain years in California. The nematodes are introduced with the potting soil. The symptoms of infestation are a slight water-soaking at the base of the fronds, after which the tissues turn a dull brownish black. Control has been obtained by steam sterilization of the potting soil, flats, and pots.

340. RODIONENKO, G. I. 635.977
Some biological characteristics of *Populus diversifolia* Schrenk. [Russian].
Sovetsk. Bot., 1945, 13: 6: 35-40.

In the regions round Lake Balhas there are towns and settlements in the sandy dry steppes where this species of poplar is able to grow, and could be planted for decoration. Attempts at propagating it by seed, various kinds of cutting, and by grafting it on *Salix purpurea* all failed. Under natural conditions, it spreads by means of creeping underground roots. Pieces of these were therefore planted as early as possible in spring before the hot dry weather set in and they struck root. Woody cuttings formed calluses but no roots. The species cannot thrive in soil which exceeds a certain degree of salinity.

341. TJUTJUNNIKOV, A. I. 635.944
Tulipa dasystemon Rgl. and *T. tarda* Staff. [Russian].
Sovetsk. Bot., 1945, 13: 5: 37.

author draws attention to the fact that W. R. Dykes in

his book on *Tulipa* species in 1930 wrongly refers to *Tulipa tarda* as *T. dasystemon*. He shows how the two can be distinguished and notes some of the advantages of *T. tarda* for decorative purposes.

342. WHITEMAN, T. M., AND MCCLELLAN, W. D. 635.944: 632.19

Tip curvature of cut gladioli.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 515-21.

An investigation of the phenomenon and of possible methods of obviating it.

343. DENNY, F. E. 635.944
Favorable conditions for the treatment of dormant gladiolus cormels to increase germination.
Contr. Boyce Thompson Inst., 1945, 14: 43-9, bibl. 5.

From the results of these and previous experiments the author concludes that the favourable conditions for obtaining good germination of gladiolus cormels are as follows: Store the cormels over winter at a temperature of 5° C. (41° F.) to 10° C. (50° F.). Start the chemical treatment 10 to 20 days before it is planned to plant. Treat the cormels in containers that can be closed, using 1 c.c. of 40% ethylene chlorohydrin for each 75 g. of cormels (7 drops per ounce, or 1½ teaspoonfuls per pound, or 1 pint per 80 pounds), incorporating the chemical into cheesecloth of a size sufficient to avoid dripping, spreading the cloth loosely on a piece of paper towelling at the top of the container. Seal the container and let it stand for 4 days at room temperature (about 22° C.). Remove and store the treated cormels in air at room temperature for 1 to 2 weeks and then plant. If the ethylene chlorohydrin available is the anhydrous chemical, prepare the 40% solution from this by adding 1½ volumes of water to 1 volume of the anhydrous chemical and mix thoroughly.

344. ANON. 635.944: 632.3/4+632.8

Diseases of gladioli.
Agric. Gaz. N.S.W., 1946, 57: 93-7.

The following diseases of gladioli are described and control measures recommended: Scab (*Bacterium marginaria*), hard rot (*Septoria gladioli*), Botrytis core rot, Fusarium rot, dry rot (*Sclerotinia gladioli*), mosaic, and yellows (*Fusarium oxysporum* var. *gladioli*). General measures for the control of gladiolus diseases are: The plants should be lifted about six weeks after flowering and allowed to dry out; diseased corms should then be culled and burned, and the remainder stored in a well-ventilated, cool, dry place. Allowing the plants to remain in the soil too long after flowering, especially if the soil is wet, increases the chances of disease infection.

345. ANON. 635.944: 632.73

The gladiolus thrips (*Taeniothrips simplex*).
Agric. Gaz. N.S.W., 1946, 57: 89-91.

Although preferring the gladiolus this thrips may also infest iris, calla or arum lily, torch lily or "red hot poker" (*Kniphofia* sp.), montbretia (*Tritonia* sp.), tiger flower (*Tigridia pavonia*) and carnations. The thrips and its life history are described. The spray recommended for field control is Paris green ½ oz., brown sugar 2 lb., water 3 gal. It should be applied in the form of a fine mist as soon as the first injury is noticed. Recent experiments with DDT dust and 0.1% DDT emulsion spray have given promising results, but it is too early yet to make a recommendation for its general use against this thrips. Dusting with derris powder in kaolin or talc has given good results.

346. TOMPKINS, C. M., AND ARK, P. A. 585.471: 632.4
Seedling disease of yellow calla, caused by *Corticium solani*, and its control.
Phytopathology, 1946, 36: 699-702.

A destructive seedling disease of yellow calla (*Zantedeschia elliptica*) in California is caused by *Corticium solani*. It is

favoured by warm weather, excessive moisture, poor drainage, the use of unclean, untreated seed, close planting of seed and mulching. The chief symptoms are a brownish-black discoloration of the cortical tissues of the fibrous roots, usually starting at the tips and progressing towards the crown. Infected seedlings develop yellow leaves which wilt, collapse and die. The disease can be readily controlled by using clean seed treated with a suitable fungicide, planting the seed at wider intervals, avoiding excessive irrigation and mulching, selecting a well-drained site, and cultivating frequently to provide good soil aeration.

347. LUYTEN, I. 635.944
Over goeden en vervroegden, bloei van *Hippeastrum*. (Good and early flowering in *Hippeastrum*.) [2½ pp. English summary.] Meded. Lab. pl. physiol. Onderz., Wageningen, 70, 1946, 31 pp.

The general cultural operations for *Hippeastrum* are first described, i.e. planting, manuring, greenhouse temperatures and hot water treatment to induce flowering in bulbs that are less than normal flowering size. Experiments are described for determining the best treatment for obtaining early flowering. Recommendations for obtaining blooms at Christmas or early in the New Year are: Take up the bulbs in September, keep for 4½ weeks at 15° or 17° C. followed by 4 weeks at 23° C., then place in a greenhouse kept at 17°-24° C.

348. SCHENCK, P. J. 632.651.3
Stengel-, blad- en wortelaaltjes. (Stem, leaf and root eelworms.) Cult. Hand., 1946, 12: 28-31.

Descriptions with illustrations of the damage caused by species of eelworms to ornamental plants, with particular reference to *Aphelenchoides olesistis*, *A. longicollis*, *A. ritzema-bosi*, and *Heterodera marioni*. Control measures

for diseased plants, cuttings and "mother plants" infested with species of *Aphelenchoides* are warm water treatments: 50° C. for 5 minutes, or 43° C. for 10 minutes. For dormant tubers infested with *Heterodera* the recommendation is immersion in water at 43°-48° C. for 20 to 30 minutes.

349. BATSON, F. S., AND MONOSMITH, R. O. 635.976 + 635.977
a An illustrated guide to care of ornamental trees and shrubs. Bull. Miss. agric. Exp. Stat. 354, 1941, pp. 57.
b ELLIOTT, F. H. 635.965.23
Saintpaulia leaf spot and temperature differential. Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 511-4, bibl. 4. Trials at Ithaca, N. York.
c KAMP, J. R., AND WEINARD, F. F. 635.937.34: 631.542
Pruning experiments with greenhouse roses. Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 463-4.
d KAMP, J. R., AND HALL, S. W. 635.939.516
Effect of height of topping on *Antirrhinum majus*. Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 507-8.
e PATTERSON, C. F. 635.935.722
New hardy lily hybrids. Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 498-500.
f WEINARD, F. F., AND KAMP, J. R. 635.939.872
The effect of spacing of gardenia plants on yields of flowers. Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 525.

CITRUS AND SUB-TROPICALS.

350. ROBERT, P. 634.3
L'évolution de la production des agrumes dans le monde. (The history of citrus growing throughout the world.) Fruits d'Outre-mer, 1945, No. 3, pp. 74-82.

Production and export figures for the principal citrus-growing countries are examined and the causes underlying recent changes and trends discussed.

351. ROBERT, P. 634.3
L'évolution du commerce mondial des agrumes et les principaux courants internationaux. (The development of world trade in citrus fruits.) Fruits d'Outre-mer, 1946, No. 6, pp. 135-41 and No. 7, pp. 172-82.

Graphs and tables are presented in a comprehensive survey of the production and exports of the chief citrus-growing countries, leading to an analysis of present-day difficulties in trade and transport.

352. GUILLIERME, R. 634.1/8: 551.566.1
L'Institut des Fruits et Agrumes coloniaux. (The Institute of tropical and citrus fruits.) Fruits d'Outre-mer, 1945, No. 2, pp. 34-5.

The monthly journal "Fruits d'Outre-mer" is the official organ of the I.F.A.C. which was founded in February, 1942, to provide technical services, research stations in the colonies and a centre of information in Paris for all fruit growers and the trade in the French Colonial Empire. M. Guillierme is the Director of the I.F.A.C., and in this letter of welcome to readers of the journal he congratulates growers and all connected with the Colonial fruit trade on the way they carried on, in spite of difficulties, during the occupation of France, sketching their plans and hopes for the future.

353. GUEST, P. L., AND ROSENBERG, G. 634.3(83)
Chile's expanding citrus industry. Agric. Amer., 1946, 6: 98-100, 107.

Chilean planting of citrus, almost entirely lemons and oranges, has expanded rapidly during the last few years; winter oranges ripen there in June, July and August. New lemon orchards have lifted Chile to possibly fifth or sixth place in world lemon acreage, based upon 1939 area estimates for other countries. Of the 14,800 acres of citrus in Chile, about 58% are under lemons and the other 42% under oranges. Citrus has been planted on many types of soil, some of which are highly calcareous, but light texture soils predominate. They range from about pH 5.5 in the most southern area to pH 7.0 to 7.5 and in some places, in the Santiago section and northern valleys, as high as 8.0. Malnutrition symptoms, particularly chlorosis, indicative of both mineral deficiencies and excesses, are quite common in orchards on calcareous and high pH soils, but the specific minerals involved have not yet been determined nor remedial measures worked out. No regular fertilizer practice has been established, but the application of Chilean nitrate is quite common in all districts. There was at one time a tendency to prune citrus too severely, causing damage to the trees and reducing production. The only insect of widespread importance attacking citrus trees in Chile is the purple scale (*Lepidosaphes beckii*), although the California red scale (*Aonidiella aurantii*) is now a serious pest in the Quillota region. Other pests of some importance include mealybugs, red spiders, thrips and aphids. Control measures consist of annual application of 1½% to 2% oil spray. Brown-rot gummosis is common on lemon and orange trees which have been budded or planted too low, and brown rot of the fruit is sometimes severe. *Tristeza* is not known to occur in Chile.

354. KOŽIN, A. E. 634.3(479.22)

A contribution to the history of introduction of citrus fruit into Georgia [U.S.S.R.]. [Russian.] *Sovetsk. Bot.*, 1946, 14: 2: 85-100, bibl. 27.

This fascinating article throws much fresh light on the obscure chapter of the history of citrus fruit in Transcaucasia. On the basis of his historical researches and comparative linguistic studies the author comes to the following conclusions. It was only in the second millennium A.D. after the Arab conquest that *Citrus medica* and *C. aurantium* were introduced into Georgia. It is probable that the cultivation of lemons and sweet oranges first began after the Turkish conquest, but it is unlikely that any groves existed before the end of the eighteenth century. Further developments occurred in the nineteenth century after union with Russia and in our own time after federation with the U.S.S.R.

355. GIANOTTI, A. A. F. 634.31: 581.49

Densidad de estomas en las variedades de naranjo dulce (*C. sinensis* [Linn.] Osbeck) Valencia y Lue Gim Gong. (Density of stomata in the sweet orange varieties Valencia and Lue Gim Gong.) [English summary.] *Bol. Fruit. Hort. Flor. Buenos Aires*, 1945, No. 93, pp. 193-8, reprinted from *Ingen. Agron.*, 1945, 7: 193-7.

No significant difference was found in the density of the stomata of the two varieties.

356. INNES, R. F. 634.323-1.8

Fertilizers experiments on grapefruit in Jamaica. *Trop. Agriculture, Trin.*, 1946, 23: 131-3.

The detailed progress of the field trials, whose main findings over the first 10 years are here reported, has been published in the Annual Reports of the Department of Agriculture, Jamaica. The two principal sites are at Grove Place Experiment Station and Wakefield (St. Catherine) where soil conditions are in marked contrast as shown by the optimum manurial treatments for Marsh's Seedless grapefruit found by experiment; at Grove Place—S/A m. 1½ lb. per tree per annum, S/Pot. 1½ lb. at planting; S/A m. 6 lb., S/Pot. 4 lb. at 8 years and older. At Wakefield—S/A m. 1 lb., super. (18%) 2 lb., S/Pot. 1 lb. after planting; S/A m. 3½ lb., super. (18%) 7 lb., S/Pot. 7 lb. at 6 years. The following points are noted specially: (1) Premature fruit drop was beneficially affected by N and K applications. (2) Growth responses, shown in the size of the canopy more than in trunk diameter, were very marked in the first 2 years from planting, but thereafter trees in all treatments grew at a constant rate. (3) Core and skin thickness were increased by K and decreased by P (on phosphate-deficient soils). (4) K increased the seediness of the fruit. (5) Fruit juice quality was shown to be sensitive to fertilizer treatment. (6) Work, still in progress, on leaf and fruit analyses is quoted and its value as a means of establishing critical minima of important nutritive elements is discussed. The future programme is outlined.

357. ROY, W. R., and GARDNER, F. E. 634.31-1.8

Seasonal absorption of nutrient ions by orange trees in sand culture. *Proc. Amer. Soc. hort. Sci.* for 1946, 1946, 47: 107-18, bibl. 4.

A record was made in Florida of the monthly absorption of N, P, K, Mg and Ca by two groups of Parson Brown orange trees in sand culture. One group was fed continuously with complete nutrient solution, the other intermittently with this solution and intermittently with water. Increased rate of absorption of all ions did not begin in spring till some time after bloom. Though field conditions are very different, this observation does suggest the possibility that fertilizer programmes might be made more efficient and less wasteful by varying the formula to comply more nearly with the reasonable ability of trees to absorb the various ions and thus obviate leaching. The continuously fed trees produced an average of 10.3 lb. of fruit per tree as against

6 lb. of the intermittently fed trees. The total absorption of all ions by the latter was approximately one-fifth of that absorbed by the constantly supplied trees. This difference in absorption was out of all proportion to difference in yield or tree growth. It seems likely that the trees on continuous feeding took in more nutrients than they could advantageously use.

358. CUENOT, G. 634.322: 581.145.2

La fructification capricieuse du Clémentier. (Irregular fruiting behaviour in the Clementine.) *Fruits d'Outre-mer*, 1946, No. 12, pp. 365-70.

The Clementine orange has generally been regarded as a seedless, sterile hybrid which arose from a cross between a Mandarin and Bigarade orange. In recent years, however, growers have observed irregularities in its fruiting behaviour, notably the appearance of seeded fruit in an otherwise normal crop and poor yields, to such an extent that numerous trees have been replaced by topworking with other citrus varieties. The author summarizes and compares the conclusions of three independent investigations into this problem—Petit in Algeria, Lacarelle in Morocco and Bou Bono in Spain: (1) The vigorous Bigarade orange rootstock contributes to lack of fertility in the Clementine. (2) Good crops are obtainable from unproductive trees by making a double incision in the trunk (ring-barking without lifting the bark), but further observations on the long-term effect of this treatment are necessary, and it is, at best, only a partial solution of the problem. (3) The Clementine, or at least certain strains of the variety, is self-sterile and parthenocarpic has been shown to occur in some types, but the authors do not agree on their proportional occurrence, due probably to scion variability. (4) For future planting, scions should be selected from a parthenocarpic strain (to ensure seedlessness) and growers must perfect their cultural methods—particularly in regard to irrigation, manuring and pruning—so as to obviate the necessity for ring-barking.

359. REUTHER, W., and CRAWFORD, C. L. 634.323-2.191

Effect of certain soil and irrigation treatments on citrus chlorosis in a calcareous soil: I. Plant responses. *Soil Sci.*, 1946, 62: 477-91, bibl. 21.

Young Marsh grapefruit trees were set out on a calcareous soil in a split-plot design for the purpose of evaluating the effect of various soil treatments and two moisture levels on the prevalence of foliage chlorosis. During the summer virtually no chlorosis occurred on any of the plots regardless of moisture treatments, but during winter and early spring chlorosis increased very markedly on the wet (high-moisture) plots and only slightly on the dry (normal-moisture) plots. On the other hand, most of the wet trees made more growth and had somewhat larger leaves than the dry ones. Trees treated with a very heavy application of triple superphosphate produced a profusion of foliage symptoms suggesting zinc deficiency, which persisted even in summer in both moisture treatments. Very heavy applications of sulphur induced poor growth, very small leaves, and foliage symptoms suggesting salt toxicity. Plots treated with a large amount of chopped alfalfa hay made exceptionally good growth and possibly developed somewhat less chlorosis in winter than any of the other treatments. Very heavy applications of nitrogen, steer manure, or magnetite (an iron oxide ore) did not prevent the occurrence of considerable chlorosis in the high-moisture plots during winter and early summer. Neither soil treatments nor irrigation treatments had any significant effect on the dry weight of the leaves. [From authors' summary.]

360. VIENNOT-BOURGIN, G. 634.3-2.4

A propos des pourritures des agrumes. (Citrus fruit rots.) *Fruits d'Outre-mer*, 1946, No. 6, pp. 164-70, bibl. 1.

The literature on citrus fruit-rots caused by *Penicillium* spp.

is reviewed; the causal organisms are described with illustrations, and methods of control advised by workers in other countries are outlined.

361. ANON. 634.3-2.4
Armillaria control. Compressed air used for soil removal.

Agric. Gaz. N.S.W., 1946, 57: 177-8.

A method is described for removing the soil from the crown roots of citrus trees infected with *Armillaria mellea* to prevent the rot spreading to the main roots and butt. The equipment comprises an air compressor such as is used to operate pneumatic drills. The work is carried out at a pressure of about 80 lb. Two hoses 60 feet long are attached, each with a 6-foot rod equipped with a pistol grip shut-off. The mouth of the rod is directed to the area to be treated and the soil blown away in short blasts. Thus treated, and well manured and cared for, an infected tree can be kept in a reasonably productive state for years.

362. BLACKFORD, F. W. 634.3-2.95
The spring spray programme in the citrus orchard.
Qd agric. J., 1946, 63: 82-3.

Home-made cuprous oxide mixture applied when most of the fruit has set—that is, when one-half to three-quarters of the petals have fallen—is the all-important spray for the control of most diseases disfiguring the fruit in the later part of the season. To be ready for use, the stock mixture or concentrate must be made up a little time beforehand, as it has to age in the barrel for at least a fortnight, preferably longer, before it is in the form found to be the most effective. With the spring application there may also be included in the spray mixture the zinc sulphate-lime or zinc sulphate-caustic soda spray for mottle leaf, lead arsenate for the grasshoppers which disfigure the rind of the fruit, and nicotine sulphate for aphids which sometimes are serious on the young growth.

363. HELY, P. C. 634.3-2.64
Snails on citrus trees.
Agric. Gaz. N.S.W., 1946, 57: 239-40.

The common "shell-back" snail is sometimes a very serious pest of citrus trees, principally oranges and grapefruit. Orchards low-lying or in the neighbourhood of creeks and swamps, are particularly liable to attack. Heavy autumn rains following droughts are always likely to stimulate snail invasions in plague numbers. During cool showery conditions the young snails move up into the trees and feed on the foliage and fruit. Various methods of control have been recommended, but all have some disadvantages. Ducks are excellent, but require to be run continuously in comparatively small numbers. Bran baits are useful and should be used when snails are active: calcium arsenate at the rate of 1 lb. to 16 lb. of bran is effective. Metaldehyde and bran bait may be safely scattered over the trees, but under orchard conditions this is not very effective. Sprays of cryolite, barium fluosilicate and DDT have been tested, but are not effective enough to be of any real value. A Californian recommendation is mentioned, viz. tartar emetic 1 lb., sugar 2 lb., water 50 gal. (United States gal.). A combination of bordeaux mixture, white oil and nicotine sulphate gives a good kill and knockdown in trees heavily snail-infested, and used in conjunction with poison baits or ducks is very effective, a suitable combination being bordeaux mixture 2-2-80, white oil emulsion 1 gal., nicotine sulphate $\frac{1}{2}$ pint. Trees sprayed with bordeaux mixture for the control of fungous diseases are not likely to become snail-infested for several months. Hand collection and destruction of adult snails concentrated on the trunks during summer will amply repay the labour involved.

364. ANON. 632.64
Plague of giant snails.
The Times, 16 Nov., 1946, No. 50610, p. 4.

Giant snails which the Japanese cultivated for food are multiplying rapidly and destroying vegetation and native

gardens in New Guinea. They are 4 to 5 inches long and 3 inches high, and are causing much damage by eating wild paw-paw, sweet potatoes and yams. They have not got a natural enemy, but it is suggested that a firefly common in Zanzibar attacks snails of this type.

365. MELLO, D. A. 633.492
Cultura da batata doce. (Cultivating the sweet potato.)
Ceres, 1946, 7: 54-60.

The sweet potato is recommended for cultivation because of ease of culture, high nutritive value, adaptability to various conditions of soil and climate, and high yield. The ideal climate for it is one with abundant rains well distributed, warm nights and sunny days during the growing period, and low humidity as the plants approach maturity. Advice is given on the preparation of the soil, the production of slips for propagation, planting, cultivation, harvesting and preservation of the crop, and rotation.

366. MARTIN, J. A., JR. 633.492-1.531.17
Germination of sweet potato seed as affected by different methods of scarification.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 387-90, bibl. 1.

Tests at Clemson, S. Carolina, indicate that where considerable quantities of sweet potato seed are involved, the seeds can best be scarified by soaking in concentrated H_2SO_4 for 45 to 60 minutes. Where, however, a high percentage of germination is wanted and time is not important, abrasion is the best method of scarifying.

367. EDMOND, J. B., AND MARTIN, J. A., JR. 633.491-1.523
The flowering and fruiting of the sweet potato under greenhouse conditions.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 391-9, bibl. 3.

Observations made at Clemson, S. Carolina, on flowering and fruiting habit of the sweet potato and notes of controlled pollination and handling of seeds and seedlings. The work is in preparation for development of new types by breeding.

368. ANDERSON, W. S. 633.492
Sweetpotato plant production in Mississippi.
Bull. Miss. agric. Exp. Stat. 349, 1940 (reprinted 1945), pp. 20, bibl. 6.

The recommendations made include the following: (1) In order to assure freedom from disease use vine cuttings for growing the seed crop and plant these on disease-free soil. (2) The roots kept for seed should be small sizes from high-producing hills. (3) Sweet potatoes that are to be used for seed must be harvested before any frost occurs. Even exposure to temperatures below 40° F. may prevent sprouting. (4) "Commercial handling" in the harvesting operation was compared with "careful handling". Roots in the former category were thrown from three adjacent rows into the centre row, forming a heap row, and then taken up into crates, while those of the other lot were placed into crates directly from the ploughed-up row. The tabulated data show a striking advantage in favour of careful handling in respect of number of plants obtained per bushel of seed and in respect of earliness. (5) Three bedding materials for seed—soil, sawdust, and sand—were compared. In a flue-heated hotbed, soil gave by far the best results, whereas in a greenhouse bench the two other media proved just as good. In case sawdust or sand are used, it is therefore necessary to apply heat uniformly and to water and fertilize adequately. (6) The bed should be warmed up to about 85° F. before planting the seed, which is to be covered with 3 in. of bedding medium. (7) After pulling the plants and before heeling them in damp sawdust, dip the roots in a 20-20-50 bordeaux mixture. The construction of various types of propagation beds is described in detail, both diagrammatically and by photographs.

369. ANDERSON, W. S., AND RANDOLPH, J. W. 633.492

Sweetpotato production. Time of planting and hill spacing studies.

Bull. Miss. agric. Exp. Stat. 378, 1943, pp. 22.

In 1943 the U.S.A. was producing sweet potatoes on approximately 1,000,000 acres, in which Mississippi farmers had a share of about 10%. The only factory for sweet potato starch production in the country was in that State. Since 1934 comprehensive experiments with the crop have been carried out at the Agricultural Experiment Station, the present bulletin reporting the results of time of planting and hill spacing tests, conducted with the varieties Porto Rico and Triumph. With both varieties highest total yield and greatest net profit were obtained from April as against later plantings. The hill spacings recommended are: (1) Porto Rico grown for food: 12-16 in. (2) Triumph grown for 'starch or food: 24 in. until the middle of May and 16 in. when planted later.

370. KIMBROUGH, W. D., FIEGER, E. A., AND LEWIS, H. 633.492: 577.16

Effect of date of planting and time of harvesting on the carotene content of sweet potatoes of the Porto Rico variety.

Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 400-2, bibl. 3.

In south Louisiana only late planted (6 July) sweet potatoes showed appreciably less carotene content in roots of marketable size than those planted earlier, namely on 27 April, 16 May and 14 June.

371. ANDERSON, W. S., AND RANDOLPH, J. W. 633.492

Sweetpotato production: Fertilization and hill spacing studies.

Bull. Miss. agric. Exp. Stat. 402, 1944, pp. 22.

The results of 4 years' experiments with sweet potatoes for industrial utilization show that the application of a 6-8-8 fertilizer at the rate of 500 lb. per acre in combination with a 20-in. hill spacing of plants gave the highest net returns. The most favourable fertilizer placement was found to be in bands 3 in. to the side of and on a level with the plant roots at transplanting time. Variations in rate and placement of fertilizer and in hill spacings had little effect on the starch content.

372. EDMOND, J. B. 633.492

Cooperative studies of sweet potato plant production.

Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 403-6, bibl. 1.

Studies of the effects of nitrogen supply, time of harvesting, curing and storage conditions on sweet potato production at the Mississippi and S. Carolina stations.

373. RANDOLPH, J. W., AND ANDERSON, W. S. 633.492

Sweetpotato production: mechanical equipment studies.

Bull. Miss. agric. Exp. Stat. 392, 1943, pp. 96.

The profusely illustrated bulletin covers all phases of sweet potato growing with different kinds of equipment. Harvesting methods receive the most detailed treatment on 50 pages. In addition to the commercial types, experimental machinery is discussed in the chapters devoted to transplanting and harvesting.

374. RANDOLPH, J. W., AND ANDERSON, W. S. 633.492

Digging table stock sweetpotatoes with broad base plows.

Circ. Miss. agric. Exp. Stat. 111, 1943, pp. 7.

Tools for harvesting table stock sweet potatoes and adaptations of ploughs to the special requirements of digging the crop are described and illustrated.

375. ANDERSON, W. S. 633.492:1-8

Fertilizers for starch sweetpotatoes.

Bull. Miss. agric. Exp. Stat. 367, 1942, pp. 22.

The experimental results show that on Mississippi sweet-potato soils the Triumph variety, which is grown for starch

manufacture, is best suited by applications of a 8-8-8 fertilizer at the rate of 600 lb. per acre or a 6-6-6 fertilizer at the rate of 800 lb. per acre.

376. PERSON, L. H. 633.492:2.3

The soil rot of sweet potatoes and its control with sulphur.

Phytopathology, 1946, 36: 869-75.

The soil rot of sweet potatoes caused by *Actinomyces ipomoea* Person and Martin is widespread in Louisiana and other parts of the United States. In years of low rain fall the disease may be severe enough to cause almost total loss. Many roots are destroyed and the young plants either die or their growth is so checked that vines are not produced. When conditions are less favourable for the disease a satisfactory yield may be obtained, but the quality is poor because many potatoes are misshapen or covered with unsightly lesions. In very wet years losses from soil rot were negligible. The parasite is not important at a pH of 5.0 or less. Soils in which the disease has been troublesome vary from pH 5.6 to 5.8, and by applying sulphur at rates of 500 to 800 lb. per acre it has been possible to lower the pH of these soils to about 5.0 and to maintain it at that level for 4 to 6 years.

377. ENGELBEEN, M. 633.85

Les aleurites. (*Aleurites* spp.)

Bull. agric. Congo belge, 1946, 37: 255-338, bibl. 4.

This article condenses the conclusions of a large number of authorities on the agricultural and economic aspects of tung culture. Following a botanical description of the known species of *Aleurites*, the author analyses the factors which experience in other countries has shown to determine success or failure in establishing the two economic species—*A. fordii* and *A. montana*. Efforts to acclimatise these species in the Belgian Congo have met with varying success: where they have failed, this has been due as much to genetical causes as to unsuitable ecological and cultural conditions. The extreme variability of seedling populations offers some hope that, by selection, types will be found which are adapted to a wider range of environment. Work along these lines is in progress, but in the light of present knowledge it has been possible to recommend with confidence the planting of *A. montana* in the district of Kivu. The crop does not make heavy demands on labour, and costs may be still further reduced by interplanting with coffee bushes in the older plantations, which permits coffee crops being taken up to the time when the tung trees are coming into bearing. No strains of *A. fordii* are yet available which can be recommended for the Congo. Apart from the restriction placed on the expansion of the industry by the lack of suitably adapted species or clones, the future economic position of tung oil in the world's markets has to be seriously considered—in particular the possibility of large exports of superior oil from China, and the threat of synthetic drying oils being produced, similar to or even better than tung oil. Mainly on this account, quality of oil is of primary importance in all future selection work and field trials.

378. GREER, S. R., AND OTHERS. 633.85

Tung culture in southern Mississippi.

Bull. Miss. agric. Exp. Stat. 409, 1944, pp. 26.

Advice is offered on methods of establishing tung orchards, soil management, pruning, harvesting and storing based on experiments by the Mississippi Agricultural Experiment Station. The species grown is *Aleurites fordii*, approximately 300 acres of which were planted up to the end of 1944 at the Experimental Tung Field near Poplarville. Selection of site is considered the most important factor in establishment, high rolling land on sandy loam or similar soil type being regarded as the most suitable. Although budded trees of selected clones have given yields almost double that from seedlings, experimental work has not yet progressed far enough to recommend bud grafting as a commercial practice. For the present, growers are advised to raise

selected seedlings in a nursery and transplant into the field. Recommendations for summer and winter cover crops are given, and the results of fertilizer experiments detailed to indicate the optimum rates of application for trees of different ages. Whilst nitrogen has the most pronounced effect on growth and yield over the whole growing period, phosphates are of importance in the earlier years and potash was found to increase oil content on a "whole fruit" or "per ton" basis.

379. NEFF, M. S., AND POTTER, G. F. 633.85-2.112
Factors affecting growth of newly transplanted tung trees during dry weather.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
153-60.

In southern Georgia and western Florida with an annual rainfall of 50 in., droughts often occur in spring and autumn. These are bad for the growth of newly transplanted tung trees. Under such conditions hoeing an additional 10 times minimized the drought effect. Mulching with 1 bushel of sawdust per tree, though less effective than hoeing, was helpful. Heavy fertilizer applications early in the season tended to aggravate the drought effects on growth. Late fertilizer applications tended to promote late autumn growth but did not result in cold damage.

380. MYERS, A. T., AND BRUNSTEITER, B. C. 633.85: 581.192
Spectrographic determination of mineral composition of the tung leaf as influenced by the position on the plant.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
169-74.

Nine elements were determined by spectrographic examination of leaf tissues. Their concentrations varied according to the position of the leaf on the trees. The best samples for comparison of effects of nutritional treatment on tung leaf composition were found to be fully expanded leaves from the middle nodes of the shoot. Comparison of the composition of the bottom and top leaves on the same plant showed a greater difference for most elements than that found between the median leaves from plants receiving widely different fertilizer treatments.

381. PAINTER, J. H., AND NEFF, M. S. 633.85-1.546
Vase-form training as a corrective measure for potential "cart wheel" tung trees.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
175-7, bibl. 2.

If tung trees pruned to one bud at planting fail to branch the first season, they generally throw out a whorl of branches from the terminal group of buds in the second season. Such trees, known as cartwheels, are weak in structure. Trials started at Lloyd, Florida, in 1940 indicate the value of vase-form training, not only as a corrective measure but also as a general practice.

382. MERRILL, S., JR., AND GREER, S. R. 633.85-1.8
Three years' results in fertilization of tung seedlings in the nursery.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
181-6, bibl. 1.

Trials at the Mississippi Experimental Tung Farm showed that under conditions obtaining there the application of 20 lb. N+18-20 lb. P_2O_5 per acre to seedling tung in the nursery gave a marked response. Very little response followed the application of one or other of these alone, and no response was given to K, though the authors suggest K should still normally be given as a species of insurance. Poultry droppings, 1,800 lb. per acre, before planting proved excellent for growth. Superphosphate appears preferable as the source of P_2O_5 .

383. GREER, S. R. 633.85-1.8
Fertilizers for young tung trees.
Inf. Sheet Miss. agric. Exp. Stat. 314, 1944, pp. 2.

Report of a fertilizer trial at the Experimental Tung Field,

Poplarville (Norfolk sandy soil) to test the effect of N, P, K, Mg, and Ca alone and in combination (the table of yields shows no results from plots manured with single fertilizers) on 3-year-old bud-grafted trees of 5 clones of *Aleurites fordii*. A profitable increase in yield of nuts was obtained by application of P (as sodium phosphate) either alone or combined with other elements. N, alone, gave a small increase in yield, but exerted its maximum effect in combination with P and Ca. Both Ca and Mg had little influence on the crop, whilst K—except in combination with P—depressed the yield. The latter element was, however, the only one to produce an increase in the oil content of the fruit. The differential response of the 5 clones to the 16 manurial treatments is shown in a table. The level of significance is not stated.

384. GREER, S. R. 633.85-1.8
Fertilizing young tung trees.
Inf. Sheet Miss. agric. Exp. Stat. 345, 1945, pp. 2.

Crop yields are summarized for the seasons 1943 and 1944 in a manurial experiment with young trees (*A. fordii*) planted in 1941 as bud-grafts of 5 clones, situated at the Experimental Tung Field, Poplarville, on cut-over Norfolk fine sandy loam. All trees received nitrogen and four other elements—P, K, Mg and Ca—were added in different combinations. Highest yields were obtained from the NP plots. Mg and K were beneficial when applied separately but not together. Ca only produced significant increases when added with P. Clone A.12 (Alabama No. 12) gave the best response of any clone in the NP plots, but not in all manurial treatments. Other experiments indicate that 7-8-year-old tung trees respond well when fertilizers are applied to the leguminous cover crop; this can be done with distributors and thus reduce labour costs.

385. HAMILTON, J., AND DROSDOFF, M. 633.85-1.51+1.8
The effect of cultivation, watering and time of fertilization on the growth of transplanted one-year-old tung trees.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
160-8.

Following planting failures on Norfolk fine sand in the Ocala, Florida, investigations, here described, were undertaken. It was found that by far the greatest response in tree growth was to cultivation, which always produced satisfactory trees. Watering and late manuring were also beneficial, but not to the same extent. The work continues.

386. GREER, S. R. 633.85-1.874
Summer legumes with tung trees in South Mississippi.
Inf. Sheet Miss. agric. Exp. Stat. 328, 1944, p. 1.

Instructions are given for the cultivation and manuring of *Crotalaria intermedia* and Alyce clover, the two main summer legumes recommended for tung orchards. If *crotalaria* seed is difficult to obtain, strip planting at 12-15 ft. intervals (using 3-5 lb. seed per acre as against 20-25 lb. when broadcast) is advised. Alyce clover seed must be broadcast at a rate of 8-10 lb. per acre. A phosphatic fertilizer is necessary to give best results; basic slag produced more than 5 times the green weight of *crotalaria* compared with an NPK mixture. The value of summer legumes both to the tung crop (as green manure) and for the feeding of stock (as hay) is discussed.

387. HAIGH, J. C. 634.651-1.521
The improvement of papaw by selection—II.
Trop. Agriculturist, 1946, 102: 17-22.

The two trials described by the author had as their objective the selection of the best line from a mixed population of the papain-producing variety of papaw with a view to propagating a strain of superior quality to those then available in Ceylon. A preliminary tapping experiment was made at Nalanda Station some 10 years ago, but unfortunately the

progeny of the best selections from that test were not available for the present trials which had to be undertaken at Peradeniya Experiment Station, using unselected seed. Tapping technique was the same as in the first trial: all trees were tapped by each of the tappers in rotation, and the times of tapping so arranged as to minimize the effect of this factor on yield. The period of tapping in the second trial was 3 months (dry season), whilst in the third trial—planted with selections from the second—tapping was carried on for 14 months, the yields during the first two months being disregarded. Both trials were laid out in randomized blocks and records were taken of the weight of dried latex per tree per tapping, and the number of fruits tapped per tree. The results show that the yield per fruit is more likely to be governed by the size of the fruit than by inherent variations in latex-producing capacity, a fact which suggests that a long-range breeding programme may be necessary to effect any further marked improvement in yield. Rainfall, it is pointed out, may influence yield by its effect on pollination and fruit setting or more directly by interference of latex flow during tapping; but the data failed to bring out a positive correlation except between yield and rainfall at the time of tapping. From this the author concludes that (1) rainfall probably enhances yield through an increase of root pressure, and (2) yields are higher during wet weather—a point of special interest in view of the common practice in Ceylon of tapping only in the dry season when sun-drying of latex is most practicable. Efficient means of drying latex in wet weather need to be perfected.

388. CADILLAT, R. 634.651

La papaye. (Papaw.)

Fruits d'Ouïre-mer, 1946, No. 11, pp. 340-4.

A general article describing the chief characteristics of the papaya plant, its cultivation, utilization and the return that it may be expected to give the grower. Special mention is made of the properties of papain and methods of harvesting and treating the latex.

389. LEROY, J. F. 634.651

Le papayer (*Carica papaya* L.) et les problèmes scientifiques que posent sa culture et son amélioration. (Papaw: scientific problems concerning its cultivation and improvement.)

Fruits d'Ouïre mer, 1946, No. 11, pp. 331-7.

The chief problems discussed are: sexuality, parthenocarp and fertilization, correlation of secondary characters with sex, and methods of selection. In regard to the latter, the author points the need for finding new varieties suitable for growing in warm temperate countries.

390. HOFMEYER, J. D. J., AND VAN ELDEN, H. 634.651:576.312.3:547.944.6

Tetraploidy in *Carica papaya* L. induced by colchicine.

S. Afr. J. Sci., 1942, 38: 181-5, bibl. 3. [Received 1946.]

Tetraploidy in *Carica papaya* has been successfully induced by treating the terminal buds of seedlings with colchicine. The most effective concentration was found to range from 0.06% to 0.1%. Out of 64 treated plants, 14 tetraploids were obtained, of which 9 were females, 4 males and 1 hermaphrodite. Tetraploid plants showed increase in the size of pollen grains, flowers, seed and leaves, and in general vigour. Both male and female tetraploids proved to be highly fertile. Male tetraploids appear to possess more male-like qualities than the male diploid, as shown by the absence of signs of sex-reversal, but from this one experiment the ratio of sexes appears not to be adversely affected by colchicine treatment.

391. AGNEW, G. W. J. 634.651

Papaw culture in Queensland.

Qd agric. J., 1946, 62: 203-14.

The chief papaw districts in Queensland are on the South Coast, in the Brisbane district, near the North Coast, the

Central Coast district and the far North Coast areas. The papaw is not a very difficult plant to grow, but in establishing a commercial plantation and increasing the yield therefrom certain important cultural points must be observed; these are fully discussed here. In North Queensland, results of trials with potted seedlings up to 15 weeks after germination indicated that favourable growth response was obtained from the use of organic fertilizers, particularly dried blood. Plants receiving no lime showed chlorotic symptoms and dropped their lower leaves prematurely, leaving an "umbrella" top. In a pot experiment with Nambour sandy loams more than 100% increase in height during the first 21 weeks was obtained by the application of hydrated lime at the rate of 4 tons per acre. It is considered that the following fertilizer measures will prove satisfactory in most instances: A NPK 8-12-6 mixture applied at the following rates per tree, (1) 4 oz. for trees up to 3 months old; (2) 12 oz. for trees up to 6 months old; (3) 2 to 3 lb. for trees from 1 year old upwards. The fertilizer should be given in 3 or 4 applications during the growing and blossoming period in September, November, and February, with a light application in April. On depleted soils a basal dressing at time of planting is to be recommended. Hydrated lime as an initial application, broadcast at the rate of 3 to 4 tons per acre, should be beneficial, particularly on soils registering below 5.5 pH. Lime applied about 3 months in advance, combined with a legume cover crop before planting the trees, will assist in restoring fertility in many so-called "worn-out" coastal orchard lands, which it is intended to plant with papaws. Plants respond well to mulching with dry grass hay, cowpea hay, or other litter.

392. AGNEW, G. W. J. 634.651-1.56

Papaw latex production in Queensland.

Qd agric. J., 1946, 63: 74-80.

As a result of the recent increasing demand for papain, investigations on the papaw (*Carica papaya*) and its fruit have been undertaken in Queensland. Notes are given on latex collection from the fruit and the difficulties encountered in tapping. The best results are obtained by tapping fruit during the wet summer months of January, February and March, and especially following rain. Latex flow appears also to be greatest early in the morning. The latex is more easily collected from dwarf trees than from tall-growing varieties. The most desirable varieties are those that bear medium-sized fruits. The feature of free-hanging fruits is one which, besides being dependent on varietal type, is also considerably affected by closeness of planting, and by extent of effective pollination of all fruit on the tree. It is considered that the fruits of some male trees could be utilized for the production of papain. Fruits which have been tapped are condemned for the fresh fruit trade because of their unsightly appearance, but they are suitable for canning.

393. SLOAN, W. J. S. 632.713:634.1/7

The fruit spotting bug.

Qd agric. J., 1946, 62: 229-33.

The fruit spotting bug (*Amblypelta lutescens* Dist.) is best known as a pest of the papaw in coastal districts of central and north Queensland. Other host plants are passion fruit, granadilla, banana, custard apple, mango, pineapple, cassava, beans of various kinds, frangipanni, *Peltophorum* and some native trees such as white cedar and the rough-leaved fig. Papaw trees of all ages are attacked by both immature and adult bugs, but injury is most severe on those that are less than nine months old. The damage to the growing tip is particularly serious, but green and ripe fruits may also be injured. The damage to seedling papaws is sometimes fatal if the plants are neglected, but older trees survive even heavy and prolonged attacks. The appearance of the trees in which the growing tips have been injured is very characteristic, for the terminal growth consists of a dense bunch of leaves with short distorted stalks. Some shedding of fruit occurs on weak trees, but in general

setting is not affected. On cassava and frangipanni injury to the vegetative growth is similar to that on the papaw. On custard apple, granadilla, banana, passion fruit, pineapple, beans and mango, abnormalities in growth are less common and fruit spotting is more characteristic. The life history and habits of the bug are described. Hand-picking the bugs is a moderately effective and reliable method of protecting trees until they are old enough to tolerate injury under good growing conditions. When the grower becomes familiar

with the habits and appearance of the pest the trees can be hand-picked rapidly, for the small lumps of latex at new feeding punctures and the distortion of young leaves in the terminal are easily distinguishable signs of injury. Seedbeds may be protected by regular hand-picking. The tops of any seriously injured trees should be cut away. Fortunately applications of a 5% nicotine dust or a dust containing equal parts of ground pyrethrum flowers and kaolin have shown much promise in preliminary field trials.

TROPICAL CROPS.*

394. PYNAERT, L. 58.006(493+675)
Les origines du Jardin colonial de Laeken et sa contribution au développement agricole du Congo. (The foundation of the "Colonial Garden" at Laeken and its contribution to agricultural development in the Congo.)
Bull. agric. Congo belge, 1945, 36: 57-78.
The status of the Colonial Garden at Laeken, near Brussels, is distinct from that of a Botanical Garden in its narrowest sense, having the purely practical aim of serving as a receiving station for plant material obtained (under its auspices) by explorers from all parts of the world. There the plants are grown, multiplied and finally despatched to the Congo for trial and exploitation. The policy of the "Colonial Garden" is dictated by the agricultural and horticultural needs of the Congo. Its inception was largely due to the eminent Belgian botanist Emile Laurent who, in order to establish the first Botanical Garden in the Congo, at Eala—an essential step in the agricultural development of the young colony—foresaw the necessity of a "Colonial Garden" in Belgium which would expedite the necessary plant introductions. With considerable assistance from King Leopold II, the two projects quickly took shape and the author, at present honorary Director of the "Colonial Garden", traces their history and makes clear the vital part played by the "Colonial Garden" in the agricultural development of the Congo.
395. ERLANSON, C. O. 581.9(86.2)
The vegetation of San José Island, Republic of Panama.
Misc. Colls. Smithsonian Inst., 1946, Vol. 106, No. 2, pp. 12.
Up till 1944, when the U.S. Army established a post there, the island of San José—second largest of a group of small islands in the Bay of Panama—had been uninhabited for at least 80 years; but there is evidence of shifting cultivation having been practised in the coastal belt prior to that period. From a consideration of the topography and vegetation of the island, and its inaccessibility to markets on the mainland, the author concludes that the island could not easily support an agricultural economy much above subsistence level, and suggests the adoption of a forestry programme based on teak, mahogany and African mahogany.
396. POBENOE, W. 551.566.1(8): 633/635
Algunos problemas de la agricultura tropical americana. (Some agricultural problems of tropical America.)
Rev. Inst. Def. Café Costa Rica, 1946, 16: 467-91.
After a brief introduction contrasting the conditions in tropical America with those of temperate regions, the climate and soils are described, followed by the particular problems associated with the more important crops cultivated there, viz. sugar-cane, maize, coffee, cocoa, banana, fibre plants, citrus, pineapple, mango, avocado, hevea, and Manila hemp. An account is given of agricultural education in tropical America and of the various experiment stations of the region.
- * See also 317.
397. CARTON, P. 633/635(59)
L'Oeuvre de l'Institut des Recherches agronomiques et forestières de l'Indochine au cours de la période 1925-1943. (The work of the Agricultural Research Institute of Indo-China over the period 1925-1943.)
Agron. trop., 1946, Nos. 3-4, pp. 115-24.
The Institut Scientifique in Indo-China was founded by Professor Auguste Chevalier in 1918, but later, in 1925, its work was taken over by two daughter Institutes—one for the study of oceanography and fisheries, the other for agriculture and forestry. The organization and achievement of the latter, from its inception up to the present day, form the subject matter of this note. The Institute is organized in two sections serving North and South Indo-China respectively, each section comprising five divisions devoted to problems of Soil Science, Genetics, Botany and Ecology, Phytopathology and Forestry, with two additional divisions in the North section for Sericulture and Fisheries. Attached to these sections there are a number of experimental stations and sub-stations situated in the principal agricultural and forest regions of the country. Some idea of the scope of the Institute's achievements may be obtained from the classified bibliography of its publications which occupies over 4 pages of the article.
398. MOLINA MAYOL, J. 631.556.1/9: 382.6(87)
Posibilidades venezolanas para la exportación de frutas y hortalizas. (The potentialities of Venezuela for the exportation of fruit and vegetables.)
Terc. Confer. interamer. Agric., Caracas, 1945, No. 27, 38 pp.
This publication comprises (1) A list of the quantities of fruit and vegetables licensed for export from Venezuela in 1942 and in 1944. It shows an increase during the period for each commodity, the increase in some cases being considerable; thus the exportation of the avocado went up from 53,215 kilos in 1942 to 211,370 in 1944. (2) Notes on the cultivation of the orange, banana, beetroot, carrot, cabbage, and onion, together with graphs showing for each of these the amounts exported to the Antilles, the percentages exported from the chief ports, and the prices on the Caracas market from 1940 to 1944.
399. WHITE, D. G., and VILLAFARÉ, A. G. 632.954
A tropical-weed killer.
Agric. Amer., 1946, 6: 126-8.
Successful results are recorded from the use of 2,4-dichlorophenoxyacetic acid (2,4-D) against certain tropical weeds, viz. nutgrass (*Cyperus rotundus* L.), dayflower (*Commelina longicaulis* Jacq.), caladium (*Caladium* sp.), water hyacinth (*Eichhornia crassipes* Solms.), royal waterlily (*Victoria regia* Lindl.), lotus lilies (*Nymphaea* spp.), and manila grass (*Zoysia matrella* (L.) Merr.).
400. DRUMMOND, O. A. 633.682-2.3/4
Doenças da mandioca. (Diseases of cassava.)
Ceres, 1946, 7: 24-33.
The diseases of cassava in Minas state, Brazil, are described under (1) Latex disease—withering of leaves and exudation of latex—attributed to *Bacterium manihotus* n.sp., but the organism is not described. (2) Broom disease (virus).

(3) Root rot (*Diplodia cacaucicola*). (4) Pith rot, said to be bacterial. (5) Anthracnose (*Gloeosporium* sp.). (6) Common mosaic and yellow mosaic (virus diseases). (7) Oidium. (8) Leaf spots and blotches caused by *Cercospora henningsii*, *C. caribea* and *Periconia* sp. General recommendations for controlling these diseases consist chiefly in the removal of diseased plants and the selection of healthy stock for propagation.

401. ARAQUE, R. 633.71: 679.7
Cultivo y curación del tabaco. (Cultivation and curing of tobacco.)
Terc. Confer. interamer. Agric., Caracas, 1945, No. 43, 103 pp.

The morphology and special qualities of different varieties of tobacco are described, and some account is given of the chemical composition of tobacco, environmental factors suitable for the plant, preparing the ground, manuring (the use of green manuring, farmyard manure and chemical fertilizers), sowing the seed, cultivating, irrigation, stripping the lower leaves, decapitation (removal of terminal bud), removal of young shoots, pests and diseases, and methods of harvesting.

402. DE MOWBRAY, E. G. B. 633.72(698.2)
Report on the tea industry of Mauritius.
Publ. Colony Mauritius Development and Welfare 34, 1946, pp. 39, Re. 1.-.

The three reports contained in this publication deal respectively with (1) areas already planted, (2) new development and (3) future organization and marketing of the tea industry in Mauritius. Total production for the season 1945-46 amounted to 511,500 lb. made tea. Slightly less than a third of the 1,812 acres of tea under bearing in 1946 belongs to Bois Chéri, a well-run estate, the rest of the acreage is made up by 72 small holdings which lack efficiency. The only modern tea factory with a capacity of 500,000 lb. made tea per annum belongs to Bois Chéri. The recommendations made for the improvement of cultural practices relate largely to the small holdings. The introduction of a better type of tea is suggested, the most suitable jat probably being a really good Ceylon hybrid, such as Chapleton or Bogawana. The immediate appointment of a Government Tea Officer and the establishment of a tea research station are strongly advised. Prospects for the industry, when properly developed, are considered good. Some 50,000 acres of excellent land are available.

403. BOKUČAVA, M. A. 633.72: 581.192
Changes of different fractions of tanning substances in the tea leaf during growth and processing.
[Russian, English summary.]
Biokhimiya, 1946, 11: 263-71, bibl. 17.

The polyphenols and catechols of the tea leaf are the active and mobile forms of tanning substances. During growth the amount of free forms of these compounds decreases with a corresponding increase of the combined form. Among the soluble tanning substances the polyphenol-catechol fraction decreases with the age of the leaf with a relative increase of tannins. The latter are probably formed from the former. The older the leaf the polyphenol-oxylase is less active. This is probably the reason why coarse leaves are poorly fermentable. During processing of the tea leaf the polyphenol-catechol fraction disappears and the bitter taste disappears also; true tannin is formed which is responsible for the taste of the tea. It has been found that in the formation of the tea extract the principal role is played by the polyphenols and catechols, whereas in the formation of the aromatic substances, besides these compounds, the tannins participate also. [From author's summary.]

404. BALAHONOV, P. I. 633.72-2.3/4+2.6/7
The chief pests and diseases of tea and their control. [Russian.]
Publ. Sočinski Res. Stat. sub-trop. south. Fruitgr., Krasnodar, 1940, 15 pp. [Received 1946.]

The pests and diseases are treated individually, symptoms

and control measures being given. They include the tea moth (*Parametriotes theae* Kuns.), brown beetle (*Maladera japonica*), maize butterfly (*Pyrausta nubilalis* Hb.), tea aphid (*Toxoptera aurantii* B. de F.), tea mite (*Eriophyes carinatus* Gr.), root diseases, grey leaf spot (*Pestalotia theae* Saw.), and brown leaf spot (*Colletotrichum camelliae* Mass.).

405. KAMPFRAATH, A. A. 633.72
Aanteekeningen omtrent de rehabilitatie van de theecultuur. (Notes on the re-establishment of tea culture.)
Landbouw, 1946, 19: 54-69.

The greater part of this article is devoted to field practice for the restoration of tea culture in the Dutch East Indies, and deals with soil treatment, pruning, diseases and pests (particularly the plant bug *Helopeltis* and the root rot fungi *Ganoderma pseudoferreum* and *Rossellinia* sp.), soil cultivation, manuring, interplanting with leguminous plants, and interplanting with young tea plants in heavily pruned plantations. Notes are also given on seedling plantations, tea nurseries, means of transport, factories, workmen, materials and implements. The requirements for planting 70,000 ha. are tabulated.

406. HENAO JARAMILLO, J. 633.73(87)
La industria cafetera en Venezuela. (The coffee industry in Venezuela.)
Terc. Confer. interamer. Agric., Caracas, 1945, No. 39, 36 pp.

A description of the cultivation of coffee in Venezuela, illustrated by 22 photographs.

407. STOVALL, R. P. 633.73(729.3)
Dominican coffee.
Agric. Amer., 1946, 6: 87-90.

Most of the coffee produced by the Dominican Republic is grown in the mountainous regions at an altitude of 2,000 to 5,000 feet, but in the Cibao Valley there are a few mixed coffee and cacao plantations at almost sea level. The coffee trees are gradually being removed from the mixed plantations, however, because the quality of lowland coffee is not so good as that of the highland, and the coffee trees do not permit the cacao to have the best conditions for maximum production. The only variety cultivated is *Coffea arabica*. The growers follow the practice of providing shade for their coffee trees. The plantain or banana tree is used as a temporary shade, but this is replaced as soon as possible by the guama tree (*Inga vera* Willd.), which is the permanent shade for the coffee tree. Some producing trees are 100 years old, but most of the trees in the Republic are between 25 and 40 years old. Although the total area covered with coffee trees is less than 131,000 acres there are more than 36,000 farms, many of which have less than 5 acres of coffee trees. Notes are given on harvesting, marketing and government regulations.

408. PORTIÈRES, R. 633.73: 581.145.1: 551
Action de l'eau, après une période sèche, sur le déclenchement de la floraison chez *Coffea arabica* L. (The effect of rainfall, after a dry spell, on blossoming in *Coffea arabica* L.)
Agron. trop., 1946, No. 3-4, pp. 148-58.

Following observations made in 1933-4 at Bingerville (Ivory Coast) on the relation between blossoming and rainfall in several species of *Coffea*, it was decided to carry out experiments to establish the quantitative basis of this relationship. The observations were made in 1943 at Sérédon (French Guinea) where, in contrast to the equatorial climate of Bingerville, there are two clearly marked seasons in the years—a long rainy season and a short dry one—a circumstance which results in a corresponding well-marked periodicity in flowering. Eight plots, each composed of 4 bushes of *C. arabica* var. *maccanta*, received on the 30th rainless day amounts of water corresponding to rainfalls of 0, 2, 5, 10, 20, 30, 40 and 50 mm. respectively.

Length measurements of flower buds were taken at 4 periods: before watering, and 5, 14 and 23 days after watering, on 10 flowering branches in each of the 4 bushes comprising a plot. The following conclusions are drawn from the experimental data: (1) Lack of water inhibits differentiation of the flower buds. (2) Rainfall in excess of 3 mm. is sufficient to induce blossoming. (3) All buds open the same day whatever their initial size or the quantity of water received above 3 mm., but the number of buds developing is roughly proportional to precipitation. (4) Maximum size of buds was reached in 5-14 days, depending on their initial size; all buds opened on the 14th day. (5) A single fall of rain may be sufficient to cause several successive blossoming periods, whilst on the other hand light falls, though by themselves insufficient to induce blossoming, may by their cumulative effect bring about flowering.

409. TELFORD, E. A. 633.73(729.5)-1.459
Saving Puerto Rican coffee soil.

Agric. Amer., 1946, 6: 118-21.

A historical survey of the cultivation of coffee in Puerto Rico and an account of the damage caused by erosion. Today the Soil Conservation Service is striving to avoid erosion damage by advocating terracing and mulching. The materials which can be used for mulch, or ground cover, are grasses, ferns, cohite morado (*Callisia monandra* Sw.) or other low-growing plants which grow in the shade. The individual terrace, as known in Puerto Rico, is a small bench terrace large enough to accommodate a single tree. Generally speaking the bench should have an area corresponding to the vertical shade cast by the crown of the tree.

410. HOWES, F. N. 633.74(667)
The early introduction of cocoa to West Africa.
Reprinted from *African Affairs*, July, 1946,
pp. 152-3.

Historical records show that cacao in both the Gold Coast and Nigeria originated from a common source—Fernando Po, where it had been earlier established from introductions by the Portuguese, probably from Brazil. This common origin is reflected in the striking varietal uniformity of the cacao at present grown in those countries. In Sierra Leone, on the other hand, cacao of a different type is found and the author's recent examination of old records at Kew suggests that it is derived from West Indian seed obtained through Kew in the year 1864.

411. POSNETTE, A. F. 633.74(666.8)
Report on cacao cultivation in the Ivory Coast.
1946, pp. 13, bibl. 2 (mimeographed).

The author, a member of staff of the West African Cacao Research Institute, Tafo, toured the Ivory Coast for about a fortnight. He finds himself strengthened in his belief that research and the strict application of its findings is now the last hope for cacao cultivation in West Africa. Although the French Government is interested in maintaining cacao growing and encourages new plantings in this, its only cacao producing territory, the industry is declining at a rapid rate, coffee growing being easier and more profitable. The organization of cacao research in French West Africa is discussed and here the newly established Cacao Research Station at Abengourou proposes to set up several small sub-stations on the site of swollen-shoot outbreaks. The evidence obtained supports the view that in West Africa cacao generally the swollen-shoot virus is endemic and of long standing in some indigenous host or hosts. Severe damage by the capsid *Sahlbergella singularis* and bad cultural practices are important contributory causes to the decline in Ivory Coast cacao, more so than swollen shoot at present.

412. CARLETTO, G. M. 633.74: 575.17
O número de cromossomos em cacauzeiros.
(The chromosome number in cacao.)
Bol. tec. Inst. Cacau Bahia, Ser. "Cultura de Cacau", 6, 1946, pp. 31-42, bibl. 7.

The normal diploid number of chromosomes of 5 species of *Theobroma* was found to be 20.

413. CARLETTO, G. M. 633.74: 581.162.3
A polinização controlada na flor do cacauzeiro.
(Controlled pollination of cacao flowers.)
Bol. tec. Inst. Cacau Bahia, Ser. "Cultura de Cacau", 6, 1946, pp. 1-30, bibl. 15.

The morphology and biology of cacao flowers is described. The materials and methods necessary to ensure self- and cross-pollination are given in detail and illustrated. With this technique the author obtained 70-4% of fruit set in 213 self-pollinated and 45-1% of fruit set in 31 cross-pollinated flowers.

414. QUATE, G. S. 633.85
Grass oil from Guatemala.
Agric. Amer., 1946, 6: 122-5.

The production of volatile oils from the highly scented grasses citronella (*Cymbopogon nardus*) and lemongrass (*C. citratus*) has in recent years become a part of Guatemala's agricultural economy. Both grasses yield a light-coloured volatile oil with a pleasant odour. Lemongrass is more easily distilled than citronella and is rather hardier, being less susceptible to damage by abnormally wet weather or by insects. Citronella has the disadvantage of being rather shallow-rooted, and is thus easily disturbed, especially when young. Harvesting, replanting and processing are described.

415. RAMASWAMY, B. V., AND OTHERS. 633.88.11.871-1.56
Essential oil from *Eucalyptus globulus* (Nilgiris).

J. Indian Inst. Sci., 1946, 28A, Part III, pp. 57-62.

Distillation of eucalyptus oil from the blue gum, *Eucalyptus globulus*, is a growing industry of considerable economic importance mainly confined to the Nilgiri hills. Data are presented from an analysis of freshly distilled Nilgiri oils, and the proportions of essential oils, with their physical constants, are compared with data from foreign sources. By careful fractionation, the Nilgiri oil conforms to B.P. specifications,* and the chlorinated cineol fraction is considered worthy of commercial exploitation.

416. GUILLIERME, R. 634.1/8(666.8)
Les cultures fruitières de la Côte d'Afrique française en 1945 et leur avenir. (Fruit-growing in French West Africa during 1945 and its future.)
Fruits d'Outre-mer, 1945, No. 4, pp. 108-18.

Present economic conditions are discussed in relation to the West African fruit trade with particular reference to the dried banana, banana, citrus and pineapple industries.

417. ALIBERT, H. 633.85-2.76
Étude sur deux insectes parasites des noix de palme en Afrique occidentale. (A study of two oil palm pests in West Africa.)
Agron. trop., 1946, No. 3-4, pp. 173-6.

Two species of beetle which do damage to oil palm nuts in storage (prior to crushing) are illustrated and described—*Pachymerus lacerdae* Chev. (*Bruchidae*) and *Coccotrypes congolus* Hagedorn (*Scolytidae*). Suggested control measures include: (1) regular harvesting and collection of fallen nuts and any which may have become lodged in the leaf bases, (2) destruction of epiphytes growing on the oil palms, (3) crushing the nuts as soon after harvesting as possible, (4) fumigating infected nuts in storage and destroying stocks too heavily infested for control.

418. MASCRÉ, M., AND PARIS, R. 633.88
Fruits et graines d'outre-mer utilisés en thérapeutique. (Tropical fruits and seeds used in therapeutics.)
Fruits d'Outre-mer, 1946, No. 8, pp. 226-30.

Published work on the therapeutic value of cola nut is reviewed. Reference is made to several species of *Cola*, including *C. nitida* and *C. acuminata*—the two most important—with brief notes on the alkaloids obtained from fresh and dried nuts.

419. DE VRIES, O. 633.912(92)
 Problemen bij de rubbercultuur in Nederlandsch-Indië, gezien door de oogten van een oud-gediende. (The problems of rubber culture in the Dutch Indies, as seen by an old hand.)
 Reprint from *Landbouwk. Tijdschr.*, 1941, 53, No. 648, 10 pp.
 A review of the past, present and future of the rubber cultivation and rubber in industry. Stress is laid on the high productivity of *Hevea*, with but little exhaustion of the soil, compared with other crops.
420. WHELAN, L. A. 633.912
 Field experiments on Dartonfield Estate—XXVIII.
Quart. Circ. Ceylon Rubb. Res. Scheme, 1945, 22: 31-4.
 Rubber growth and yield records are presented in a progress report on two replanting experiments. In No. 2 Replanting Experiment—1938, 19½ acres, the significant effect of phosphate applied early in the life of the tree continues to be reflected in both girth and tapping figures. No. 3 Replanting Experiment—1936, 9½ acres, shows similar trends to those noted in previous years, namely: no differences between methods of opening (platforms, trenches and pitted drains) and superiority of nursery buddings over field buddings.
421. SHARP, C. C. T. 633.912
 Yields of budded rubber and clonal seedlings in commercial tappings.
Quart. Circ. Ceylon Rubb. Res. Scheme, 1945, 22: 34-8.
 The survey of commercial yields from 71 estates covering a total area of 5,674 acres has now been extended in scope so as to include all clones (not only imported clones as hitherto) and clonal seedling families. The data are summarized in 3 tables. The behaviour of the N.E.I. and Malayan clones in Ceylon follows very closely their performance in Malaya, and general planting recommendations are on the same lines in both countries. The first yield records from a commercial planting of Prang Besar Isolated Garden seedlings show much promise, and age for age they have given better crops than Tjirandji 1 growing on the same estate.
422. MINOR, E. C. K. 633.912-69
 Description of a method and apparatus to keep Glenshiel 1 leaves free from attack by bats.
Quart. Circ. Ceylon Rubb. Res. Scheme, 1945, 22: 39-41.
 Bats appear to show a special preference for the leaves of clone Glenshiel 1: on Mirishena Estate (Kalutari district) 75% of the trees had damaged foliage. The special construction of large-meshed nets is described which, when slung between the trees, caught 96 bats in 3-4 months and put an effective stop to this menace.
423. MILLER, C. D., AND BAZORE, K. 634.1/8: 551.566.1(96.9)
 Fruits of Hawaii: description, nutritive value and use.
Bull. Hawaii agric. Exp. Stat. 96, 1945, pp. 129.
 A revised, popular edition of "Some fruits of Hawaii" (*Bull. Hawaii agric. Exp. Stat.* 77, 1936, noted *H.A.*, 7: 754) which is now out of print. Most of the information is in the form of recipes for preparing the principal Hawaiian fruits—29 in number, including 5 not mentioned in the earlier bulletin—carissa, ketambilla, mulberry, Java plum and roselle. Each fruit is dealt with separately under the headings description, history, nutritive value, supply and use. Additional data are presented in 4 appendices on methods of preserving vitamin content, and on criteria for rating fruits as sources of minerals and vitamins. The identification of fruits is aided by the inclusion of 18 full-page photographs.
424. HYDER, K. B. N. 634.1/8-1.537
 Fruit plant nurseries.
Ind. Fmg., 1946, 7: 79-80.
 The author advocates the establishment of "one-variety nurseries" of certain tropical and sub-tropical crop plants in India. One great advantage would be that no special precautions would be needed to ensure purity of the plants produced.
425. GUNARATNAM, S. C. 634.441
 The cultivation of the mango in the Dry Zone of Ceylon. (Contd.)
Trop. Agriculturist, 1946, 102: 23-30.
 Continuing his advice to orchardists in the Dry Zone of Ceylon (*ibid.*, 101: 227-31; *H.A.*, 16: 2233) the author stresses the need for selecting a few only of the best varieties, a list of which is given, to ensure obtaining marketable fruit of high quality and uniformity. The greater part of this article is occupied with an account of methods of propagation based on practical experience obtained at the Farm School, Jaffna. The "Pullima" (Tamil) varieties of *Mangifera indica*, which grow semi-wild in parts of the Jaffna district, are recommended for use as stocks in both budding and cleft-grafting techniques.
426. ROEKENS, F. 634.462
 Le caroubier (St-Jansbroodboom) (*Ceratonia siliqua*). (The carob.)
Courr. hort., 1946, 8: 377-8.
 A description of the carob tree, its uses and nutritive value. It is recommended as a tree suitable for cultivation in the Belgian colony.
427. KUSHMAN, L. J., AND BEATTIE, J. H. 634.58
 Natural hybridization in peanuts.
J. Amer. Soc. Agron., 1946, 38: 755-6.
 The observations recorded suggest that natural hybridization in peanuts is more common than previously suspected. Thrips are suspected of being at least one of the agents involved in crossing. If thrips should prove to be involved a serious problem is presented because they have a wide dispersal and are subject to movements over considerable areas.
428. MORWOOD, R. B. 634.58-2.4
 Peanut crown rot.
Qd agric. J., 1946, 63: 18-19.
 Peanut crown rot causes a wilting of the above-ground parts of the plant accompanied by rotting at ground level. The stalk and root-tissues of affected plants, just below the ground, are dark and shrunken. Frequently black masses of fungus spores (organisms not specified) appear on the shredded tissues. Wilting plants succumb and remain in a dry, shrivelled condition. In the control of the disease it is essential to avoid any excess injury to the kernels. All machine-shelled kernels are liable to some injury and should be treated with an organic mercury preparation to protect them from fungous infection. On the Virginia Bunch variety Ceresan or Agrosan is used at the rate of 1 oz. to 20 lb. of seed; for Red Spanish the rate is 1 oz. to 60 lb. of seed. Very essential in disease control is the rotation of crops. Rotation with other farm crops, such as maize, grain sorghums, sudan grass, cowpeas, etc., is quite beneficial but the best system includes a Rhodes grass sward. As a rule three years of grass should be included in every ten-year period.
429. SMITH, J. H. 634.58-2.6/7
 Pests of the peanut crop.
Qd agric. J., 1946, 62: 345-53.
 The damage caused by insect pests to peanuts in Queensland is light in comparison with that of other cultivated crops in the more important agricultural districts. Some species are important, however, and the life history, habits and measures for controlling them are given under pea mite (*Pentaleus major* Duges), the white grubs of the scarabaeid

beetle *Rhopaea magnicornis* Blk., the brown scarab beetle *Isodon puncticollis* MacL., crown borers (*Zygrita diva* Thomps., and *Sybra centurio* Pasc.), corn earworm (*Heliothis armigera* Hb.), green vegetable bug (*Nezara viridula* L.) and the mealy bug (*Pseudococcus* sp.). Minor pests are the red shouldered leaf beetle (*Monolepta rosea* Blk.) and a small scarab beetle (*Heteronyx brevicollis* Blk.). Control measures for the green vegetable bug have not been required in peanut crops; this may be due, in part, to the activity of an egg parasite (*Microphanurus basalis* Woll.) which was introduced some years ago to help to control this pest.

430. FLOCH, H., AND DE LAJUDIE, P.

634.654:632.951
Sur les propriétés insecticides de la graine de *Mammea americana*. (The insecticidal properties of the St. Domingo apricot kernel.)
C.R. Acad. agric. Fr., 1946, 32: 611-3, bibl. 6.

From the results of his experiments (carried out mostly on mosquito larvae) the author concludes that the dried powder of the flesh of the seeds of *Mammea americana* has interesting insecticidal properties, scarcely inferior to those of a commercial rotenone product with 5% active ingredients, and he envisages the possibility of its use on an important scale.

431. JOSHI, A. C.

634.6

A palm suitable for cultivation in India, *Bactris utilis* Benth et Hook. F.
Ind. Fmg., 1946, 7: 237-9.

The palm *Bactris utilis* Benth. et Hook. f. (syn. *Guilielma utilis* Oerst.), known in Costa Rica by the name of peibaybe, has been characterized as the tropical American counterpart of the oriental date palm. The tree and its fruit, its propagation, harvesting, yield and marketing are described. A raceme of mature fruits weighs about 25 lb. and, as one palm produces on an average 5 or 6 such racemes in a year, it yields approximately 150 lb. of fruits per annum. The ripe uncooked fruits contain 26.9% starch, 4.0% sugar and 5.8% fat, and their calorific value is the highest among the tropical fruits of economic value. It is rich in oil and has the flavour of coconut. It can grow from sea-level to up to about 4,000 ft. South India, Orissa, Bengal and Assam appear to be the provinces where it could be cultivated to great advantage.

432. LEPESME, P.

633.6-2.76

Les charançons floricoles des palmiers. (Flower-inhabiting weevils in palms.)
Agron. trop., 1946, No. 7-8, pp. 400-4.

The flower-inhabiting weevils represent an important group amongst palmicolous insects and the author, after briefly reviewing our present knowledge regarding them, stresses the need for further study.

433. CHILD, R.

634.61(54.8)

The coconut industry's hundred years.
Reprinted from *The Times of Ceylon*, July 13th, 1946, pp. 2.

The history of Ceylon's coconut industry over the past 100 years is reviewed by the Director, Coconut Research Scheme. Its future prosperity is shown to depend on wise international planning and recognition of the right of the producer to fair prices even in times of plenty.

434. ANON.

634.61(54.8)

The coconut industry has a bright future.
Reprinted from *The Times of Ceylon*, July 19th, 1946, pp. 4.

In an address to the Low-Country Products' Association, the author reviews the position of the coconut industry and discusses its prospects in the light of present world conditions. No appreciable increase in the acreage under coconuts in Ceylon is predicted, but there is room for considerable increase in productivity, if manuring and cultivation practices are improved and uneconomic areas replanted

with planting material raised from scientifically selected seed nuts. In the latter connexion, the valuable work of the Coconut Research Scheme is fully recognized. Examination of the export market for coconut products indicates a tendency to mill an increasing proportion of copra for oil, and it is estimated that future exports will be roughly in the following proportions: oil 55%, D.C.N. 40%, copra 5%. Potential developments in the manufacture of processed goods and in the coir industry are discussed.

435. SALGADO, M. L. M.

634.61-1/8

The use of lime and salt for manuring coconut palms.

Leaflet, Coconut Res. Scheme (Ceylon) 13, 1946, pp. 4.

This leaflet forms a supplement to Leaflet No. 12—"Notes on the manuring of coconut palms" [to be abstracted *H.A.*, Vol. 17, No. 2]. On the basis of general observations, and in the absence of data from controlled experiments, the application of neither lime nor salt to coconut palms can be recommended. Money is better spent in applying other fertilizers, particularly potash.

436. LEACH, R.

634.771-2.42

Banana leaf-spot (*Mycosphaerella musicola*) on the Gros Michel variety in Jamaica.

Govt. Printer, Kingston, Jamaica, 1946, pp. 117, bibl. 27, 2s.

The author's experiments and observations covering the period 1940-1944 on the aetiology of banana leaf-spot disease, and its bearing on control by spraying are reported in detail. The distribution of spots on the leaf is a diagnostic symptom of the type of spore causing infection; "line-spotting" of heart leaves being due to conidial infection, and "tip-spotting" of the under-surface of young, open leaves to ascospore infection. The former occurs principally in the spring and summer months, the latter in the colder part of the year, although under certain adverse soil conditions this periodicity is upset and ascospore formation may occur throughout the year. Under favourable soil conditions, the basic principle of leaf-spot control is the suppression of conidial infections by a regular 3-4-weekly spraying cycle during spring and summer. Where abnormal ascospore production occurs, as on soils with poor aeration and shallow tilth layers, intensive spraying during the winter months is necessary and steps must be taken to improve soil conditions. In this connexion, the disposal of trash should be carried out in early spring and not in autumn as usually advised. The effect of the disease is mainly seen in the plant's fruiting behaviour, causing deterioration in quality (size of finger) and grade (number of hands per bunch), and late emergence of the bunch. The seasonal variation of leaf-spot incidence is modified by climatic conditions, which differ in the four banana-growing districts of the island, and call for corresponding modifications in the spray programme.

437. MARTYN, E. B.

634.771-2.4

A note on banana leaf speckle in Jamaica and some associated fungi.

Myc. Pap. imp. myc. Inst. 13, 1945, pp. 5, bibl. 4, 1s. 3d.

The most conspicuous form of "speckling" was found to be due, as in Surinam, to the fungus *Cladorium musae*. A new species also found in association with "speckling", but only weakly parasitic, has been named *Cladosporium musae* Mason, sp.nov. An epiphytic fungus isolated from banana leaf material has been consigned to a new genus, *Zygothalia* Mason, gen.nov., and named *Z. jamaicensis* sp.nov. Both new species are described and illustrated.

438. ANON.

634.771-2.4

Squirter and black-end diseases of bananas.

Agric. Gaz. N.S.W., 1946, 57: 179-80.

Squirter disease, caused by *Nigrospora sphaerica*, is a dark, watery rot of the pulp of the fruit which starts to develop

during ripening and continues after the fruit is picked. Black-end disease is a rot or discoloration of the stalk of the fruit caused by a number of fungi, the most important of which are *Nigrospora sphaerica*, *Gloeosporium musarum*, and *Fusarium* sp. Control of squirter and black-end may be obtained by dipping the cased fruit in a fungicidal solution after packing, the most satisfactory fungicides being salicylanilide or its compounds. Of these, Shirilan A.G. should be used at the rate of 1 pint in 30 gallons of water, and Shirilan W.S. at $\frac{1}{2}$ lb. in 30 gallons of water and a wetting agent. A third preparation, Shirilan flakes, is also available, in which sodium salicylanilide is combined with a wetting agent. The time of dipping is half a minute or sufficiently long to wet the surface of the fruit.

439. ANON. 634.771-2.6/7
 Quelques ennemis du bananier. (Some pests of the banana.)
Fruits d'Outre-mer, 1946, No. 5, pp. 142-8, bibl. 2.

Brief notes on the chief insect pests and vectors of virus diseases attacking the banana, abstracted from the *Review of Applied Entomology*, 1940-44.

440. CALDWELL, N. E. H. 634.771-2.73
 Control of the banana rust thrips.
Qd agric. J., 1946, 63: 83-5.

The control of the banana rust thrips, *Scirtothrips signipennis* Bagn., in Queensland has been complicated by the increasing popularity of the Mons Marie banana, a fairly tall-growing type with bunches much less accessible than those of the Cavendish variety, but the advent of DDT may help to simplify the problem. A preliminary experiment with a dust containing 2% DDT showed distinct promise. Growers wishing to try DDT have the choice of a 2% DDT dust and a nicotine-DDT dust containing adequate amounts of each active ingredient. The dusts can be used either on covered or uncovered bunches and the interval between treatments need not be less than a fortnight. Sprays containing DDT should not be used, at present, for the control of this pest, owing to the risk of injury to the fruit.

441. CUILLE, J. 634.771-2.76
 Contribution à l'étude de la biologie de *Cosmopolites sordidus* Germ. (A contribution to the study of the biology of *Cosmopolites sordidus* Germ.)
Fruits d'Outre-mer, 1946, No. 12, pp. 360-4.

Observations on the banana weevil carried out at a newly established field station near Conakry, French Guinea, are summarized as follows: Larval development in *C. sordidus* consists of three stages, of which the first is the shortest. In the course of its development the larva hollows out a burrow 60 cm. long in the banana rhizome. The period of its development varies according to the individual and its environment. The adult begins its life by a period of inactivity lasting about 1 week, and the young female becomes sexually mature after approximately 1 month. Eggs are not laid continuously, periods of inactivity alternating with laying periods. Under certain environmental conditions, the inactive period may be prolonged. The female weevil lays its eggs singly in a predetermined place, laying 15 eggs in the 15 days of a laying period.

442. EASTWOOD, H. W. 634.774
 Pineapple growing.
Agric. Gaz. N.S.W., 1946, 57: 235-8, 302-5, 364-7, bibl. 5.

The author stresses the striking difference in the areas devoted to bananas (15,000-22,000 acres) and pineapples (250 acres) in recent years in the North Coast areas of New South Wales, despite the suitability of soil and climate for both fruits, and indicates the dangers of single crop

production on many plantations. The pineapple is suggested as one of the tropical fruits that can be successfully grown independently or in conjunction with bananas. The article discusses suitable soils and climate, methods of soil preparation, selection of planting material, cultivation, the use of paper mulch, harvesting and marketing. Field experiments showed that the advantages from the use of paper mulch are: Larger individual fruits, which give increased yields per acre; a more vigorous and uniform growth of larger and healthier plants and earlier crop; the reduction of weeding and row cultivation costs; conservation of moisture, especially in the surface layer of soil in dry weather. Moreover, heavy rain is prevented from compacting the soil around the roots of the young plants and the soil is kept friable and warmer during cold weather.

443. MACKAY, B. B. 634.774(81)
 Pineapples in northeast Brazil.
Agric. Amer., 1946, 6: 195-8.

The pineapple originated in South America and could be grown there more extensively if market outlets for larger quantities were available. This is especially true in the north-east States, where some of Brazil's best pineapples now grow. Notes are given on propagation (from suckers or from slips), diseases and pests. Black rot (*Thielaviopsis paradoxa*) attacks fruit in shipment; careful drying of the fruit stem and refrigeration are the best means of preventing it. The principal pest, *Tecla echion* L., resembles the pink bollworm but is somewhat larger. In north-east Brazil, pineapples are ready for harvesting about 11 months after the suckers (*filhotes*) are planted; thus pineapples are a year-round crop. The eight principal varieties grown in Brazil are briefly mentioned. The Brazilian Federal and State Governments are advocating a comprehensive programme for distribution of *filhotes* of known types, and for improvement in implements and methods of production.

444. DECHAND, P. 634.774: 658.8
 Le marché de l'ananas dans le monde et en France. (The pineapple market in France and throughout the world.)
Fruits d'Outre-mer, 1946, No. 8, pp. 231-49.

The need for stimulating production and consumption, the latter especially in France, is stressed in a world survey of pineapple market trends.

445. DA SILVA FERNANDES, C. 634.774: 581.45
 Da exstrutura histológica da folha do curauá (*Ananas sativus* (Lundl.) Schultes). (The histology of the pineapple leaf.)
 Reprinted from *Bol. S.A.I.C.*, Pernambuco, 1944, 11: 30-5.

A detailed account with drawings of the histology of the leaf of the pineapple variety Duckei.

446. MCKNIGHT, T. 634.774-2.4
 Water blister disease of pineapples.
Qd agric. J., 1946, 62: 278.

This brief note emphasizes that infection of the pineapple fruit with the water blister fungus [*Thielaviopsis paradoxa*] occurs mainly from spores originating from nearby dumps of infective material and from the floor of the packing shed. Growers are therefore urged to dispose of discarded pineapple material by burying or burning and to spray their contaminated sheds thoroughly with a 5% solution of formalin (see also *H.A.*, 11: 1440).

447. McFARLANE, J. S., HARTZLER, E., AND FRAZIER, W. A. 635.64: 632.651.3 + 577.16
 Breeding tomatoes for nematode resistance and for high vitamin C content in Hawaii.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 262-70, bibl. 9.

Methods and difficulties are described. *Lycopersicon peruvianum* has been shown to be heterozygous for nematode resistance and vitamin C content and to be a useful parent

448. KIKUTA, K., AND FRAZIER, W. A. 635.64: 632.8
Breeding tomatoes for resistance to spotted wilt in Hawaii.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
271-6, bibl. 14.
Breeding for resistance to spotted wilt virus, which is identical with the yellow-spot virus of pineapple, is described. A weed, *Emilia sonchifolia*, is used as a host plant in the nursery. Resistance in the Pearl Harbour variety is discussed.
449. FRAZIER, W. A., AND OTHERS. 635.64(969)
Tomato improvement in Hawaii.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
277-84, bibl. 24.
The chief varieties in the U.S.A. are not suited to Hawaiian conditions. A project is here briefly outlined, the purpose of which is by selection and breeding to provide suitable varieties. Testing methods used are described and the preliminary results are listed of that phase of the project which concerns combined resistance to spotted wilt, grey leaf spot (*Stemphylium*) and *Fusarium* wilt.
450. HENDRIX, J. W., KIKUTA, K., AND FRAZIER, W. A. 635.64: 631.521.6
Breeding tomatoes for resistance to gray leaf spot (*Stemphylium solani*) in Hawaii.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
294-300, bibl. 5.
Evidence accumulated so far indicates that with continued hybridization and selection, a large-fruited, high yielding, resistant line of tomato can be isolated without undue difficulty. [From authors' summary.]
451. TIHON, L. 635.659: 551.556.1
À propos de deux *Canavalia* rencontrés au Congo Belge. (Two *Canavalia* species found in the Belgian Congo.)
Bull. agric. Congo belge, 1946, 37: 156-62.
Notes on two leguminous plants actually found in the Belgian Congo, the cultivation of which should be encouraged as affording a much-wanted source of nitrogenous food. They are *Canavalia ensiformis* and *C. gladiata*. Their composition and cultivation requirements are considered.

STORAGE.

452. SMOCK, R. M. 634.11: 664.85.11.035.1
The influence of stored apples on the ripening of other apples stored with them.
Bull. Cornell agric. Exp. Stat. 799, 1943, pp. 36,
bibl. 17.
The stimulatory effect of one lot of apples on another varies considerably. In some experiments, as much as 50% or more of the storage life of a lot of apples was lost because of exposure to the emanations of other apples. The stimulatory emanation is presumably ethylene, but was not identified as such. The intensity of this stimulatory effect depends upon: 1. *The maturity of the lot being stimulated.* No stimulation was noted from the emanations of ripe apples on McIntosh apples once the climacteric rise of the latter was well under way. Varieties such as Rome Beauty and Rhode Island Greening, that are usually picked well before the climacteric rise, are most likely to be affected by other lots of fruit. 2. *The maturity of the fruit supplying the emanations.* Post-climacteric apples are more potent sources of this stimulatory effect than are pre-climacteric apples. 3. *The temperature of storage.* Effects were more quickly apparent and in general slightly greater at higher temperatures, but significant effects were noted at cold-storage temperatures. 4. *The number of apples supplying the emanations.* As few as 1% of the total number of apples will supply enough stimulatory emanations to cause ripening. Large numbers of ripe apples may have no more effect, or possibly even less effect, than have a comparatively few ripe apples. 5. *The composition of the atmosphere.* Stimulatory effects were commonly noted both in ordinary air storage and in controlled-atmosphere storage when ripened fruits were included with fruits prime for storage. No inter-variety effects were noted in controlled-atmosphere storage when both lots were prime for storage. 6. *The variety of the lot supplying emanations.* Some varieties seemed to have a more marked stimulatory influence on pre-climacteric apples than have others. [From author's summary.] Of the absorbents and adsorbents tested, only bromine gas adsorbed on the surfaces of activated charcoal removed the stimulatory emanations effectively.
453. VAN HIELE, T. 664.85.11.037 + 664.85.13.037
Koelproef met appelen en peren 1943/44.
(Cold storage trials with apples and pears.)
Meded. Direct. Tuinb., 1946, pp. 639-43.
In the experiments described 11 varieties of apple were stored at +3° C. and 4 varieties of pear at 0° C. to 1° C., with atmospheric humidity 90-95%. The final results for each variety are tabulated and briefly discussed. Thus the results for Allington Pippin apple were described as very good, with Court Pendu they were unsatisfactory and with York Imperial the results were particularly unsatisfactory.
454. KENWORTHY, A. L., AND GADDIS, C. H. 664.85.11: 632.944
Tolerance of apple varieties to methyl bromide fumigation.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
64-6, bibl. 4.
Studies in Delaware in 1944 and 1945 indicated that Wealthy, Delicious, York and Orleans and, to a lesser degree, McIntosh and Grimes are subject to injury or early decay when fumigated with methyl bromide. No injury occurred on the apples of 12 other varieties tested.
455. SMOCK, R. M. 664.85.11: 632.19
Some factors affecting the brown core disease of McIntosh apples.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
67-74, bibl. 7.
In New York State this physiological disorder varies in severity, being particularly noticeable in McIntosh. Observations were made on the effects of orchard treatment and of other pre-storage factors. The following facts were established. Shading of individual limbs during the growing season increased susceptibility. Nitrogenous fertilizers may sometimes increase susceptibility. The maturer the fruit, the less the brown core. Delayed storage decreases susceptibility. While specifically a low temperature phenomenon, brown core varies widely in incidence from year to year. It does not appear to be aggravated by high CO₂ concentrations at 32° or 36° F. Low oxygen levels (2%) reduced it at 32° and 36° F.
456. SMITH, E. 664.85.13.037
Handling injuries on pears following cold storage.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
79-83, bibl. 5.
Abrasion marks commonly seen on Bartlett and Anjou pears after cold storing are found to be related to the age or stage of ripeness of the fruit when handled. How prompt and adequate refrigeration can considerably lengthen the packing season of these pears is here discussed.
457. SOUTHWICK, F. W. 577.17: 664.85.11 + 664.85.25
Effect of some growth-regulating substances on the rate of softening, respiration and soluble solids content of peaches and apples.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
84-90, bibl. 9.
Both 2,4-dichlorophenoxyacetic acid and preparations

containing the methyl and ethyl esters of α -naphthaleneacetic acid markedly hastened the rate of softening of detached peaches. Moreover, applications of a talc dust containing 3% of methyl α -naphthaleneacetate to bearing peach trees hastened ripening but resulted in severe leaf injury and lowered fruit quality.

458. MORRIS, L. L., AND MANN, L. K. 635.61: 664.84.035.1

Effect of a volatile from Honey Dew melons on the storage behavior of certain vegetables.

Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 368-74, bibl. 9.

Results of trials at Davis, Calif., indicate that table-ripe Honey Dew melons and possibly other varieties too emit enough ethylene (or similarly acting substance) to reduce the storage life of cucumbers held in close proximity.

459. LOUCKS, K. W., AND HOPKINS, E. F. 664.85.31: 632.4

A study of the occurrence of *Phomopsis* and of *Diplodia* rots in Florida oranges under various conditions and treatments.

Phytopathology, 1946, 36: 750-7.

Two organisms, *Phomopsis citri* and *Diplodia natalensis*, are involved in stem-end rot of oranges. Either organism alone is capable of producing the characteristic rot. The results of experiments on controlling the disease showed that: There was no correlation between the occurrence of *Phomopsis* and *Diplodia* in the same fruit. The incidence of both organisms was reduced by debudding, and by treatment of borax before, or before and after, gassing. Removal of only the calyx, not the entire button, reduced *Phomopsis* but not *Diplodia*. Gassing with ethylene did not control the fungi, and the incidence of *Diplodia* actually increased after gassing. Borax alone reduced the incidence of *Diplodia*, but not that of *Phomopsis*. Borax applied to gassed fruit, either before, or before and after gassing, also reduced the incidence of *Diplodia*. Wetting the fruit after picking had no effect on *Phomopsis* or *Diplodia*. However, a high relative humidity during storage increased the amount of *Diplodia*. Storing fruit in diphenyl-treated wraps did not affect either of the fungi.

460. HALL, E. G. 664.84

The storage of vegetables for processing.

Agric. Gaz. N.S.W., 1946, 57: 27-30, 84-5, bibl. 10.

It is sometimes necessary to store vegetables for various periods before they can be handled by processing plants. When large quantities of hard vegetables are to be stored in bags, the bags should be stacked in pillars formed by laying pairs of bags crosswise up to a height of not more than six bags. The bottom bags should be laid on a false floor of slats on 2 x 4 inch bearers, and the individual stacks or pillars should be separated by an air space of 3 or 4 inches. The special requirements for successful storage are discussed in relation to potatoes, carrots and parsnips, cabbages, onions, silver beet, beetroot, swede turnips, peas and green beans, green corn, and tomatoes.

461. TROTMAN, A. E. 664.84.34

A note on the storage of Trinidad grown cabbages.

Trop. Agriculture, Trin., 1946, 23: 129-30.

A storage trial, under commercial conditions, of locally grown cabbages—mainly the varieties Early Flat Dutch and Succession—led to the conclusion that cold storage at temperatures ranging from 36°-42° F. is both profitable and desirable at times when low prices are ruling during a market glut. Cabbages were packed in grapefruit export crates holding about 42 lb. each and stacked in the refrigerating chamber which was cooled by air blast. Storage continued for 9 weeks, the first cabbages being withdrawn for sale after 4 weeks. Total costs of cold storage under conditions holding at the time (April-May, 1945) were estimated at

\$1.50 (Trin. currency) per 100 lb. to the end of the first month, with a further 60 cents per 100 lb. at the beginning of each subsequent month in storage.

462. KRITHE, N. 633.491-1.532.2: 664.84.21

De invloed van de bewaring der aardappelknollen op den bouw van de knoppen en op de ontwikkeling tot volwassen plant I. (The influence of storing seed potatoes on the structure of the buds and on the development to a fully grown plant.) [Summary in Dutch, English, French and German.]

Meded. Lab. physisiol. Onderz. Wageningen, No. 71, 1946, 36 pp., bibl. 8.

The object of the investigation was to find out by which method of keeping seed potatoes in winter the earliest and largest yield of tubers can be obtained. Seed potatoes of an early variety were kept from September to April at various constant temperatures from 2° to 28° C. in thermostats with constant artificial light, in a glasshouse (9° C.), and in a north room (17° C.) with ordinary diurnal alternation of light. The tubers were planted in April and the crop harvested in July. Observations were made and recorded during the storage period and after planting. This, the first publication of the series, describes the development of the tuber at the distal end of the stolon. It was found that during winter, with the seed potatoes kept at temperatures of 5° and upwards, many organs of the new potato plant are laid down, particularly the new tubers on the stolons. In some cases the terminal flower cluster on the axis was laid down before the tubers were planted.

463. VAN HIELE, T., VAN STUIVENBERG, J. H. M., AND VELDSTRA, H. 633.491-1.563: 577.17

Onderzoekingen inzake de toepassing van conserveermiddelen bij de bewaring van aardappelen. (The effect of preserving substances on the storage of potatoes.) [Summary in Dutch and English.]

Meded. Inst. Onderz. Fruit Groenten, Wageningen, Rs. 1, No. 16, 1946, 176 pp.

The influence of various preserving substances on the formation of sprouts, development of rot, deliverable weight, chemical composition and cooking qualities of potato was investigated. Two substances, Karsan and Fahlberg, proved to be of no use for this purpose, used alone or with growth substance (methyl naphthaleneacetate in solution). Rhizopon C (=methyl naphthaleneacetate on talc) 2 g/hl before winter or 1 g. of growth substance /hl in solution after winter and Rhizopon Cl g/hl after winter effected a smaller loss by sprouting and a larger deliverable weight. Greater inhibition of sprouting resulted if the growth substance was combined with quicklime; addition of paraformaldehyde, however, decreased the action of the growth substance. The influence on storage rot (caused by *Fusarium solani*) was insignificant, provided the potatoes were not kept for a longer time than would have been possible without treatment. The chemical analyses of treated and control tubers showed no significant differences, and there were no important differences during the course of the trials. The results showed that in some cases the use of growth substance means a considerable saving of produce and money, whereas in other cases the treatment is not profitable. Generally it will be useless to treat potatoes that are known from experience to keep very well.

464. SCOTT, L. E., AND MAHONEY, C. H. 635.67+635.653

a Quality changes during the storage of consumer packages of sweet corn and lima beans: progress report.

Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 383-6.

Consumer packages for the fresh market.

PROCESSING.

465. LOOMIS, N. H. 664.85.873.047
Drying of American-type grapes.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
195-8, bibl. 1.
Tests of different varieties of American grapes at Meridian, Miss., and Beltsville, Md. show that certain varieties can be successfully sun-dried for home use either with or without preliminary lye dipping.
466. MOREL, J. 664.85.771.047
Le séchage des bananes au Cameroun. (Banana drying in the Cameroons.)
Fruits d'Outre-mer, 1945, No. 4, pp. 123-5.
The note describes the construction of a small banana-drying installation capable of producing 100-120 kg. of dried bananas per 24 hours. These driers are intended for use on estates which will thus be able to process a proportion of their crop for export, the remainder going to a central co-operative factory. The drier is of the tunnel type with sliding trays in which the fresh bananas are placed. The trays are first run into a pre-heater (temperature not exceeding 80° C.) and from there into the tunnel where hot air maintains the temperature at 40°-60° C. The flues are so designed that the air circulates naturally and is reheated after passing through the tunnel. Careful control of temperatures and humidity is necessary.
467. ROCHER, H. 664.85.771.047
Étude du dosage de l'eau dans la banane sèche par la méthode de distillation. (A study of the estimation of water content in dried banana by the distillation method.)
Fruits d'Outre-mer, 1946, No. 9, pp. 258-64.
A quick and simple method is described of distilling a sample of dried banana with toluene for 1 hour to determine its water content. The technique is shown to provide a valid, comparative value for purposes of testing commercial samples, but leaves unsolved the problem of distinguishing between "bound water" and water held only by cohesion forces.
468. VILARDEBO, A. 664.85.771.047
Étude préliminaire des parasites des bananes séchées en provenance de la Côte d'Afrique. (A preliminary study of pests attacking dried bananas during shipment from French West Africa.)
Fruits d'Outre-mer, 1946, No. 13, pp. 400-4.
Five species of coleopterous insects, found in consignments of dried bananas on their arrival in Paris from the Cameroons and Ivory Coast, are described and illustrated. In several of the boxes examined the insects were found between the wooden casing and the wrapping paper—suggesting that infestation occurs after packing. Present-day difficulties of transport often result in consignments being held up in port warehouses which, if already infected with stored grain and other pests, become a potential danger to other produce such as dried bananas. Two of the species concerned here—*Sitophilus oryzae* and *Oryzaephilus surinamensis*—are common pests of stored cereals.
469. BALOG, E. G., AND CRUESS, W. V. 664.84.047
A note on compressed dehydrated vegetables.
Fruit Prod. J., 1946, 26: 38-54.
In a laboratory experiment compressed dehydrated vegetables withstood the storage conditions much better than did the ordinary or loose pack. Both packs had been stored in hermetically sealed cans at 83° to 85° F.
470. GREEN, E. L., AND OTHERS. 664.84.047
The use of sulphur dioxide in dehydration of eastern potatoes and other vegetables.
Fruit Prod. J., 1946, 26: 15-20, 26, 39-44, 61, 81-6.
The literature dealing with the sulphuring of fruit and vegetables is reviewed. The vegetable material to which sulphur dioxide was applied in the present investigation included, in addition to potatoes, sweet potatoes, sweet corn, snap and lima beans, soybeans, carrots, pumpkin and squash, okra, kale, spinach, cabbage, and sweet peppers. The technique and results of experiments are given in detail. Experience has shown that in vegetables the absorption of sulphur dioxide is much more rapid, a larger proportion of the total absorbed is firmly held, losses in drying and subsequent storage are proportionally smaller, and volatilization of SO₂ during reconstitution and cooking is less complete than in fruits. Overdosing vegetables with sulphur dioxide is thus more serious than it would be in fruits since it may be impossible to reduce its amount sufficiently in cooking to make the material acceptable to consumers. The amount of residual sulphur dioxide in cooked material that is perceptible and objectionable in taste differs greatly according as it was originally added from acid or alkaline solution. In lots of material prepared by acid and alkaline dips and containing equal amounts of SO₂ after cooking, the taste of sulphurous acid may not be detectable in the sulphited sample, while it may be so pronounced in the acid-dipped sample as to make it inedible.
471. CRUESS, W. V., AND SEAGRAVE-SMITH, H. 664.85.11.037
Observation on freezing of apples.
Fruit Prod. J., 1946, 26: 36-7, 59.
In general there are two techniques designed to retain colour in frozen apples. In one the sectioned peeled apples are steam blanched in order to prevent browning; in the other they are treated with bisulphite solution for the same purpose. The writers prefer the raw sulphited to the commercially blanched as they are apt to be richer in flavour, since blanching and subsequent fluming leach out much of the apple flavour and natural sugars. Tables of results of experiments show the extent of such leaching losses.
472. WOODROOF, J. G., AND OTHERS. 664.84.037
Studies of methods of scalding (blanching) vegetables for freezing.
Bull. Ga Exp. Stat. 248, 1946, pp. 48, bibl. 51.
1. Nine representative vegetables were used to study methods of scalding (blanching) vegetables prior to freezing. 2. Based on present knowledge and the availability of equipment, the 6 methods of scalding vegetables are, listed in order of preference: live steam, hot water, steam pressure, electronic heat, infrared light, ultraviolet light. 3. Vegetables properly scalded and otherwise properly processed kept in good condition for more than 1 year in freezing storage; offensive characteristics developed in unscalded vegetables within 3 months, and in under-scalded vegetables within 6 to 9 months; while those that were over-scalded became brown in color and lost aroma and flavor. 4. Detailed studies with snap beans and squash indicate that these products may give negative results from peroxidase tests immediately after scalding, and positive tests at a later date. 5. The optimum scalding for vegetables for freezing is that which is just sufficient to inactivate enzymes for a storage period of 1 year, and not sufficient to remove a noticeable amount of natural color, aroma and flavor from the product. [From authors' summary.]
473. PROSTOSERDOV, N. N. 663.21(47)
Soviet sherry. [Russian.]
Priroda (Nature), 1946, No. 3, pp. 29-37.
Yeasts introduced from Spain in 1908 and later were used, though only on a laboratory scale, in the production in the Crimea of a wine possessing the flavour and bouquet of sherry. The varieties of grape used in the experiments were Sersial, Pedro, Albillo, Palomino, Mantuo, Castelliano and others. In 1927, the author of the present article went to

study wine-making in Armenia, where it had been established many centuries ago. There he found a wine closely resembling the Spanish sherry, being manufactured in earthenware jars and having a crust of yeast forming on the surface and imparting to the whole wine the characteristic sherry qualities. This yeast was found to be a variety of that in Spanish sherry, and was called *Saccharomyces cheresiensis* var. *armeniensis*. Various races of it were isolated, and used in the manufacture of sherries from the grape varieties Hardži, Herdusk and Cilar. The sherries possessed all the attributes of those in Spain, with certain qualities of their own.

474. HAYES, N. V., COTTON, R. H., AND ROY, W. R. 663.83: 634.31
Problems in the dehydration of orange juice.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47:
123-9, bibl. 12.

A process employing vacuum diffusion for the dehydration of orange juice to a very palatable, virtually anhydrous powder is described with diagrams by the authors working in Florida.

475. NAVELLIER, P. 663.813: 634.1/8
Les jus de fruits coloniaux. (The fruit-juice industry in the Colonies.)
Fruits d'Outre-mer, 1945, No. 2, pp. 36-51.

After surveying the existing position of fruit-juice production in France and the Colonial Empire in relation to that of the U.S.A. and other countries, the author describes modern methods and machinery used in the industry, and concludes with a strong plea to producers to employ only the most up-to-date methods, paying due regard to the paramount importance of "quality".

476. NAVELLIER, P., AND NAVELLIER, P. 663.813
Un exemple de fabrication à Paris de jus de fruits coloniaux. (Juice extraction from tropical fruits as carried out by a factory in Paris.)
Fruits d'Outre-mer, 1946, No. 14, pp. 431-4.

How French factories have already begun processing the juices of fruit imported from the Colonies is illustrated by a description of the methods and locally-made materials used by a Paris concern in the extraction and canning of orange and pineapple juices.

477. VIZERN, —. 634.58-1.56
Traitement des arachides. (Processing ground-nuts.)
Bull. Inst. colon. Marseille, 1946, No. 8, pp. 103-16.

After a brief description of the ground nut and its seeds, an account is given of the extraction of the oil, and the subsequent processes of neutralization, decoloration and deodorization.

478. CRUESS, W. V. 634.63-1.56
Experiments on lye treatments in ripe olive pickling.
Fruit Prod. J., 1946, 26: 68-70.

In recent years commercial ripe olive pickling technique in California has greatly improved in attaining a black to dark brown colour. The present report deals with several factors studied in connexion with development of colour during processing (pickling). The best colour was attained most regularly by the use of short lye applications and short exposures until full depth of colour was developed. The use of bicarbonate solution between lyes plus air exposure, or aeration of the olives in dilute bicarbonate between lyes gave improvement in colour. The use of trisodium phosphate or sodium silicate solutions for final lye treatments gave promise of better colour retention. Addition of calcium chloride to holding solution or its application between the last two lye treatments gave better colour retention than in the untreated olives, and there was no noticeable brackish flavour.

479. ARANA, F. E. 633.821-1.56
Vanilla curing.
Circ. Fed. Exp. Stat. Mayaguez 25, 1945, pp. 21, bibl. 17.

An account of harvesting is followed by accounts of wilting the vanilla beans by the sun's rays, in the oven, by hot water by scratching, by freezing and by ethylene, together with an evaluation of these different methods. Other sections are devoted to moisture content, mouldiness, classification and packing, chemistry of vanilla, colour, vanilla poisoning, and uses of vanilla beans and the preparation of the extract.

480. AKKOYUNLU, Z. 633.71: 633.85
Tütün tohumundan yağ istihsaline ait çalismalar.
(The extraction of tobacco seed oil.) [English summary.]
Inhisarlar Tütün Inst. Rap., Istanbul, 1943, 3: 1: 1-4.

The amount of oil obtained from tobacco seeds by physical means (crushing) was found to average 27%, by chemical extraction 40%. The conclusion drawn is that it is possible to extract oil from tobacco seeds, and that the yield is good when seed production is high. The oil thus obtained can be used in the dyeing and soap industries, for machines and in some instances for cooking.

481. THORNTON, N. C. 577.16: 581.192
Factors influencing vitamin C content of asparagus, banana, and seedlings of garden pea during growth or in storage.
Contr. Boyce Thompson Inst., 1946, 14: 295-304, bibl. 19.

Asparagus buds increased in vitamin C content from 15 mg. at the dormant stage 15 cm. underground to 150 mg. per 100 g. of fresh weight when the plant was 100 cm. above ground. Green bananas containing about 15 mg. of vitamin C per 100 g. of fresh tissue decreased to about 12 mg. when the peel was full yellow, and to 10 mg. when the peel was 50% brown. Carbon dioxide treatment of asparagus spears and green bananas caused loss in the vitamin C content. Garden peas maintained a high vitamin C content when grown in a 1-500,000 concentration of ethylene in the dark. Ethylene (1-500 to 1-8,000 part of air) had no measurable effect upon the vitamin C content of the banana.

482. MERGENTIME, M., AND WIEGAND, E. H. 635.656: 581.192
Low temperature characteristics of a pea proteinase.
Fruit Prod. J., 1946, 26: 72-80, 89, 91-2, bibl. 24.

A proteolytic enzyme has been extracted from peas, partially purified and found to be similar to muscle cathepsin. The name pisin is suggested for this enzyme. Its properties have been investigated and the results are shown in tables and graphs. The action of the enzyme extract on casein is very similar in behaviour and characterization to that of autolytic proteolysis of pea juice.

483. REED, H. M. 634.662: 577.16
A note on the ascorbic acid content of the jujube.
Fruit Prod. J., 1946, 26: 71, bibl. 6.

Data obtained indicate that by proper addition of acid and pectin, a good jelly which still retains a fairly large amount of ascorbic acid can be made from jujubes [fruit of *Zizyphus vulgaris*]. They also suggest the possibility of using this fruit in combination with other fruits as a means of increasing the ascorbic acid content of the product.

484. BROWN, G. B., AND BOHN, G. W. 635.64: 577.16
Ascorbic acid in fruits of tomato varieties, and F₁ hybrids forced in the greenhouse.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 255-61, bibl. 24.

Tabulated data are given of analysis at Cheyenne, Wyo. The authors summarize their findings as follows: Statistically significant differences in ascorbic acid concentration

were found to occur among different varieties and among different F_1 variety hybrids. These data indicate that ascorbic acid concentration in tomato fruits is controlled partly by heritable genetic factors and can be manipulated by genetic methods. The data suggest that F_1 hybrids may have little or no advantage over varieties in so far as ascorbic acid concentration in fruits is concerned. Negative correlation between large fruit size and high ascorbic acid concentration in the variety test could not be attributed to varieties, blocks, or dates of harvest. In the F_1 hybrid test significant negative correlation between these characters was caused principally by differences among hybrids. This difference between the results of the two experiments may have been caused by differences in plant vigor. While ascorbic acid concentration increased with time in both experiments, fruit size and apparent plant vigor decreased in the variety test but remained relatively constant in the hybrid test. Relatively large variations caused by undetermined environmental factors suggest that greater accuracy is desirable for comparisons of ascorbic acid concentrations in tomato varieties. This substantiates the findings of other workers. It seems desirable that critical studies be made of environmental factors affecting ascorbic acid concentrations in tomato fruits to facilitate production of tomatoes with high ascorbic acid concentrations and to facilitate genetic and breeding studies. Factors deserving particular attention might include soil moisture, soil aeration, soil and air temperatures, and light. [Authors' summary.]

485. BHAGVAT, K., AND MISRA, U. C. 577.16
A comparative study of acid and enzyme extractions of nicotinic acid from foodstuffs.
Curr. Sci., 1946, 15: 349-50.

The foodstuffs examined included gram, cow pea, wheat, barley, groundnut, mustard, sesame and yeast. Generally a lower value for nicotinic acid was obtained for pulses by

acid extraction than by enzymic extraction. It is suggested that the values of nicotinic acid obtained by the enzymic extraction represent those which are biologically available.

486. LUNDER, R. 638.162
a Pollenanalytiska undersökningar av svensk honung. (A pollen-analytical study of Swedish honeys.) [English summary 1½ pp.]
Meddel. Växtskyddsanst. Stockh. 45, 1945, pp. 31, bibl. 3.
b MARSHALL, R. E. 663.813: 634.11
Prevention of sedimentation in apple juice clarified by the enzymic method.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 75-8, bibl. 1:
By the addition of non-acidulated, starch-free liquid apple pectin.
c SHEETS, O. 613.1: 664.85.047 + 664.84.047
How dehydration affects the nutritive value of fruits and vegetables.
Circ. Miss. agric. Exp. Stat. 113, 1943, pp. 4.
d SINCLAIR, W. B., AND ENY, D. M. 663.83: 634.3
Significance of the alkaline ash of citrus juices.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 47: 119-22, bibl. 6.
From a nutritional standpoint.
e VAN DUYN, F. O. 664.85.037 + 664.84.037
How to prepare fruits and vegetables for freezing with suggestions for choosing suitable varieties.
Circ. Ill. agric. Exp. Stat. 602, 1946, pp. 16.
f WANG, C. F., AND WANG, H. C. 577.16: 581.192
Provitamin A content of tea, grasses and melon leaves. [Chinese, English summary 10 lines.]
Chinese J. Nutr., 1946, 1: 25-8, bibl. 11.

NOTES ON BOOKS AND REPORTS.

487. ANLEY, G. 635.937.9
Iris. Their culture and selection.
W. H. & L. Collingridge, London, 1946, pp. 115,
bibl. 12, 8s. 6d.

Gardeners, and they exist, who for one reason or another have failed to avail themselves of the decorative possibilities of the iris in the garden scheme are likely to suffer a change of heart should they be fortunate enough to make acquaintance with this book. The eleven-page prose rhapsody which Sacheverell Sitwell has provided by way of foreword should alone be sufficient to secure their conversion and Mrs. Anley's clear-cut directions for cultivation and her clever yet simple analysis of the proper handling of colour will preclude any subsequent recantation.

The modern garden iris is a superb plant of infinite variety and it is of these that the book chiefly treats, though the more easily grown wild species are given an instructive chapter to themselves. Considerable stress is laid on the provision, where possible, of suitable backgrounds for iris plantings, and in this matter Mrs. Anley may appear ultra-particular. Those whose background must consist perforce of the close-boarded fence are given a word of sympathy though scarcely of comfort. Absolute anathema are the orange-red bricks of the jerry-builder and glossy or variegated evergreens. There are, however, many suitable background shrubs of ornamental habit, and a descriptive list of these for hedge or grouping is appended.

Supplementing the essential cultural needs of the iris are numerous little attentions which the plants appreciate, but—if we may say so—can do very well without; nevertheless a knowledge of them may be useful in emergency, and certainly their practice will provide the all-out enthusiast with constant opportunity for pottering round his treasures and ample excuse when arriving late for his meals.

The less esoteric aspects of hybridization are discussed

sufficiently to enable amateurs content with the principle of "their not to reason why" to try it for themselves, nor should the fact that only two seedlings in every thousand will be worth a second flowering bring discouragement. That beauty lieth in the eye of the beholder is never more true than in the case of the tyro regarding the first flower of his own making, yet in the garden of the discerning the most firmly beaten track will be that to the rubbish heap. Sacheverell Sitwell points out that, whereas many garden plants are reaching their climax as regards improvement, the apogee of the iris still lies beyond the horizon. He makes a moving appeal for the naming of new irises with some regard for their beauty and character. The naming of two glorious chestnut reds Sonny Boy and Cheerio is an outrage hard to bear. For such the romantic terms of the geography of snuff might serve, whether they match exactly or not—Macauba, Penalba, Masulipatam,—or of the cocoa bean—Essequibo, Guayaquil and Royal Soconusco. Returning reluctantly to earth it may be mentioned in conclusion that there are appendices on composting, showing, judging, indoor decoration and the preparation of iris root, that the illustrations are excellent and, in short, that the book is in every way most practical and up to date. G.St.C.F.

488. BUSH, R. 634.1/8(42)
Fruit growing out-doors.
Faber & Faber Ltd., London, 1947, pp. 518,
18s. net.

Those who have read and enjoyed Mr. Bush's series of Penguin handbooks on Fruitgrowing (*H.A.*, 14: 948, 949, 2012) will welcome this omnibus volume which puts all three into one book. The publishers have done a good job with nice paper, readable print and pleasant layout, and the many additional illustrations as plates add greatly to the value of the information given. There is, however, little

alteration in the text, surprisingly little in fact when one considers the opportunity this reprinting affords of complete revision. It is true that there are some additional line drawings of insects that should help the uninitiated to identify his troubles, and some of the footnotes have been brought up to date to some extent, but it is easy to find many other places where quite small changes could usefully have been made. For instance, the numbering of pages and figures is continuous throughout the book, and there seems little reason why the numbering of the chapters should not have been similarly brought into line, thereby eliminating a considerable source of annoyance to the reader wishing to consult cross references.

There is, moreover, considerable duplication of information, and this too might well have been avoided. Possibly one must accept such splitting up and repetition in a synthesized book of this nature, but is there any justification for a completely new introduction to Part III?

Mr. Bush has added some valuable pages on growing peaches as bush trees, but here again he might profitably have omitted the only slightly altered information already given on stocks, budding and grafting a few pages earlier. Actually some of this information on rootstocks is contrary to research findings, while the recommendations for bordeaux mixture are at variance with those given a few pages earlier. This latter discrepancy is doubtless due to culing information from different sources and confusion between formulæ relating to burnt lime and those relating to hydrated lime.

The illustrations have all been faithfully redrawn from the originals, usually to their improvement, but in a few cases slight changes have caused discrepancies between figure and text. Thus, the artist shows the protection of pears from birds by means of a frilly skirt of paper, Fig. 37, instead of the postcard method depicted in the original Penguin and described in the text on p. 207. Again the artist has made use of the wider page, and has so improved Figs. 64 and 65 that the footnote on p. 362 no longer applies. The figure of the mushroom shed, though referred to on p. 472, has been omitted! These and many other small errors and omissions, are to be deplored. Some of them are factual, thus the statement on p. 16 "that strawberries and raspberries must now be certified" is incorrect. The only fruits that must be so certified are actually black currants and strawberries.

One is amused to note certain alterations in an endeavour to bring the book up to date, thus "Sir William Beveridge" has been replaced by "Socialist" on p. 222, "Lebensraum", no longer topical, becomes "Elbow room" on p. 337, "Dr. Taylor is Controller of Horticulture" becomes "Dr. Taylor was . . ." on p. 320, as if he had passed away, but "Lord Beaverbrook howling for cartridge cases" still howls on p. 428.

But Mr. Raymond Bush is like that, and part of the charm of his writing are the unexpected inconsistencies. Possibly the clue to it appears on p. 18 where he tells how the book is written by sorting out "the most useful bits from the works of many dead and living authorities" and garnishing the result with a sauce of his own compounding. Occasionally the facts are lost in the sauce but, as the sauce is very palatable, most people will accept it and ask for more.

H.B.S.M.

489. CLARK, W. 77: 535.61.31
Photography by infrared, its principles and applications.
 John Wiley & Sons, New York; Chapman & Hall, London, 2nd edition, 1946, pp. 472, 92 figs., bibls. many, \$6.00 (36s.).

Horticulturists who are interested in obtaining photographic records of their work should take note of this book on infrared photography. Although there is but little mention of its application to agricultural or horticultural research it seems probable that it could be exploited with advantage. Its application to the study of plant virus diseases as indi-

cated by Bawden (*Nature*, 1933, 132: 168) does not appear to have been seriously followed up, but it does seem possible that more could be made of infrared rays in this direction. Other lines that might be further elaborated are (1) the photography of certain insect pests (p. 283), which, because of their dark chitin, offer difficulties for ordinary photography, and (2) the study of stained sections of wood (p. 285) or plant tissues where the natural pigment is reddish or brown, e.g. fungi with dark mycelium and spores, tissues discoloured by disease. The chapters that specially interest biologists are IX. Medical infrared photography, X. Infrared photography applied to botany and palaeontology, and XI. Infrared photomicrography; but anyone thinking of seriously taking up infrared photography should read carefully the earlier chapters, II to IV, on general practices and materials, and VII on sources of infrared radiation.

490. COPLEY, G. H. 634/635: 632.1/9
Garden pests and diseases.
 John Crowther, Bognor Regis, 1946, pp. 196, 9s. 6d.

This book cannot be commended except for its striking illustrations. An attempt is made to cover too wide a field. Much useful information is given, but this is interlarded with so much that is misleading or definitely inaccurate that the reader must be at a loss whether to follow any of the recommendations. There is no index.

491. CRUESS, W. V. 663.2
The principles and practice of wine making.
 Avi Publishing Co. Inc., New York, 3, 1947, 2nd edition, pp. xii + 476, \$8.

In the preface it is mentioned that the first edition was published in 1934 shortly after the repeal of the Eighteenth Amendment (prohibition) with the object of helping the many new wine producers who undertook to revive the wine industry. Professor Cruess is Professor of Food Technology and Chemist in the Agricultural Experiment Station, University of California (Berkeley) so that "attention is focussed on Californian methods and conditions" nevertheless, reference is made frequently to practice research in France, Australia and other wine regions. The wines and wine regions of the world are dealt with in Chapter 1, and it may be noted that over 90% of the wine produced on the North American Continent is made in California, mostly from *Vinifera* grapes. But in dealing with wine regions, attention is directed firstly to French wines, the author having visited the Burgundy district in April, 1939. From the account of the visit, it is evident that Professor Cruess enjoyed the society he met, the country he passed through and the wine and food he consumed. The present reviewer is thoroughly appreciative. Much first-hand information was also acquired in other French districts, Germany, Italy and Switzerland. The author had visited Spain in 1923 but as the "dry era" gave promise of becoming permanent, he omitted to visit Jerez de la Frontera. When in Europe in 1938-1939 he would have gone there but was refused a visa for entry in Spain because of the chaotic conditions. Hence the information given is largely derived from other sources, and is also the case with regard to Portugal and other European countries, Australia, South Africa and South America. Chapter 4 deals with "yeast starters". The author believes in fermenting with as pure a strain of yeast as is practicable and in holding back other organisms by "sulfiting". Directions are given for proceeding from a small culture to a quantity sufficient to add to the must in the fermenting tanks. Chapters 5 and 6 are concerned with the production of red and white table wines and the next chapter with cell operations. Besides the use of tannin, gelatine, isinglass etc., bentonite as a fining agent is referred to at some length. It is interesting to note that the Spanish clay used in Jerez district contains considerable montmorillonite, the chi-

constituent of bentonite. The ageing of wines (Chapter 8) is considered to be largely due to oxidation.

The production of sherry is dealt with in Chapter 9 and the use of film yeasts (*flor*) in developing the peculiar sherry flavour is described. Fortification with spirit is such as to give a wine with an alcoholic strength of 20 vol. per cent. Other wines such as those of port type are treated in the next chapter, and again fortification is carried to 20 v.p.c. One Californian product, Angelica, seems to be unique. Must from white grapes in a practically unfermented condition is fortified to 20 to 21 v.p.c. by addition of alcohol. Some interesting information is given about natural wines of high alcoholic content: as much as 19 v.p.c. has been attained by "syruping" and fermentation with a strain of Jerez yeast.

The following chapters deal with sparkling wines, fruit wines (plums, etc.) and the defects of wines.

In reading Chapter 15 on brandies, the reader must keep in mind the different meanings attached to the word "proof". 100 proof spirit in the United States contains 50 v.p.c. alcohol, absolute alcohol is 200 proof. Types of stills, both pot and column, are described; the reviewer doubts whether it is quite correct to say that all French brandies are made with pot stills.

Chapter 16 on winery by-products gives an account of tartaric acid recovery and also mentions the production of oil and tannin from grape seeds.

The laboratory examination of wines is dealt with at length in Chapter 17, whilst Chapter 18 briefly mentions Federal and State regulations. The two following chapters on "Wine and health" and "The serving of wine and its use in cooking" do not immediately concern the oenologist but may be read with much enjoyment and amusement. The final chapter (21) on flow sheets is short.

The book may be recommended to all engaged in the production or examination of wine; as an account of modern American practice it is indispensable. J.T.H.

492. GÄUMANN, E. 632.3/4
Pflanzliche Infektionslehre. (Plant infection theories.)

Verlag Birkhäuser, Basle, Switzerland, 1946, pp. 611 with 311 text figures and 90 tables in the text, bibl. numerous, in 11 pages, S.Fr. 48.50.

Most botanists, particularly mycologists, will be familiar with a former book by this author, either in the original or in C. W. Dodge's translation under the title of "Comparative Morphology of Fungi". Professor Ernst Gäumann of Zurich is a Swiss botanist of international reputation and that book showed the grasp that he had of this subject. The present volume deals with a subject that is of interest not only to the "pure" botanist, but more particularly to those of that increasing number of biologists who are engaged, directly or indirectly, in the study of the damage to crop plants caused by parasitic organisms. It discusses in great detail the theoretical aspects of plant infection in six chapters based on the following: 1. Infection: mechanism of infection in relation to environment. 2. The infection chain: with particular reference to sources of infection, the dispersal of the parasite, and epidemiology. 3. The parasitism of the infecting organism. 4. Predisposition of the host plant, A. congenital susceptibility, B. modifications in susceptibility due to environmental conditions. 5. The disease: teratology, pathological anatomy and physiology. 6. The control of plant diseases. The last chapter consists of only 5½ pages in which control measures are briefly discussed in general terms, under infection prophylaxis, disposition prophylaxis, and therapy. The book is primarily of theoretical interest and a detailed discussion of measures for controlling diseases is outside its scope. It seems rather unfortunate, therefore, that its sub-title should be "A text-book of general pathology for biologists, agriculturists, foresters, and plant breeders". The practical grower, who is solely or mainly concerned with eliminating

plant parasites or reducing their ravages will probably find little here to interest him; unless he has a good botanical background he will probably find that information outside his comprehension. On the other hand all who are interested in action and reaction in plant life will turn to this book for its wealth of information on the relations and antagonisms of parasites and hosts among plants.

493. GOUGH, H. C. 631.4: 632.951
A review of the literature on soil insecticides.
Imperial Institute of Entomology, London, 1945, pp. 161, bibl. pp. 16½, 10s.

This review, which is very comprehensive within its scope, covers mainly the period 1914-1940, although some later work is included. In the introduction a soil insecticide is defined as "a chemical which is applied to the soil with the object of killing one or more stages of Arthropod pests". The main part of the work is arranged under chemicals, and, within chemicals, under insects. The paragraphs on the more important insecticides conclude with a summary, giving an evaluation of their usefulness. The review will be a great boon to workers in this particular field.

494. GRAVES, G. 635.976(74)
Trees, shrubs and vines for the north-eastern United States.
Oxford University Press, New York, 1945, pp. 267, \$2 or 15s.

A descriptive handbook sponsored by the Massachusetts Horticultural Society of several hundred species of trees, shrubs and vines (ornamental, woody, climbers) suitable for planting in north-eastern United States. The value of this manual lies in the brief but adequate descriptions of the many species mentioned and arranged alphabetically throughout. It so happens that all the species discussed are equally at home in Britain, where the winters are presumably somewhat milder, and no plants requiring even light protection in this country appear to be included. Thus for woody plants that will be indisputably hardy the book will be as valuable a guide over here as in its own country. Lists of woody plants for various situations and purposes will be found on the last few pages. There is a chapter on the purchase of plants in which "caveat emptor" seem to be the operative words. A chapter on pruning is included. The book, though heavy by reason of the glazed "art" paper on which it is printed throughout, is of a convenient size for the pocket of those who have not too much regard for their clothes. There are 68 illustrations.

G.St.C.F.

495. HILLS, L. D., AND HAYWOOD, E. M. 635.64: 631.54
Rapid tomato ripening.

Faber & Faber, London, 1946, pp. 143, 8s. 6d.

In this book complete illustrated instructions are given for the construction of ripening boxes for tomatoes for the use of the amateur or small grower and for the establishment of a ripening room for the larger grower. The heating of the boxes can be done electrically or by means of hot water, and for the boxes ordinary coal gas can most satisfactorily provide the ethylene gas necessary. Details on all these points are discussed fully. The weaker brethren may possibly welcome the name of a firm which provides boxes and room ready made, and this too is given.

The authors are almost certainly right in suggesting that, once the use of such boxes and rooms is adopted, they will prove no less useful for ripening other fruits, such as strawberries, while the possibility of spreading glut crops such as plums over a longer season will be viewed enthusiastically by the enterprising fruit grower. Tentative experiments with Royal Sovereign strawberries have shown it possible to ripen them from the white stage to fully ripe in 12 hours, but further work is needed before the process can be recommended commercially.

496. KOLISKO, E., AND KOLISKO, L. 581.057: 581.14
Agriculture of to-morrow.
 Kolisko Archive, Rudge Cottage, Edge, Stroud,
 Glos., 1946, pp. 426, bibls., £2 2s.

Part I. Cosmic influences. Part II. Smallest entities: Capillary dynamolysis. Part III. Rudolph Steiner's suggestions for a renewal of agriculture. Part IV. Where do we stand today? Our tasks for tomorrow. Yes! by now the reader will have guessed. The sun, the moon, the planets, the constellations, all are in it. Yet one cannot close the book without wondering whether, after all, the authors may not have got something. If not, it will not be for want of years of laborious experimentation carried out, it is obvious, with enormous persistence.

But it is all so difficult. We are told, for instance, to activate our manure heaps with "living sulphur" obtained from wild yarrow fermented in a stag's bladder; but how many of us have access to stags? Or who in these days of the utility sausage would venture to ask his butcher for a length of ox intestine to be stuffed with chamomile flowers? The explanation that by its aid innumerable "life-forces" could be concentrated in the midden would scarcely save him from the cleaver! The manufacture of these and other specifics along the same lines are described in detail.

Part of the book, in fact, is devoted to dispelling the haze which has hitherto hung over Rudolph Steiner's technique, for although various associations and individuals believe they are practising his methods, actually his original lectures have never passed beyond manuscript form and were communicated only to a privileged few in Germany. It so happened that the junior author was entrusted by Steiner with the task of making the scientific experiments and investigations in connexion with this Agricultural Course, and on the ground that Steiner meant his suggestions to reach the whole world these are now very fully revealed. Copious data are given of actual results obtained.

The authors' "capillary dynamolysis" tests form a main theme. So far as we can understand it, a determination of the strength of the "life-force" of a given substance can be based on the pattern and colouring produced on filter paper dipped in a liquid from that substance and, after drying, dipped again in a 1% solution of nitrate of silver, gold chloride or other metal salt. Certainly the differences in pattern as illustrated between the juices of preserved and fresh fruits or identical varieties are very striking. The inference drawn from these differences is that the vigour of the fresh juice pattern indicates that it is living and of high nutritional value, whereas the feeble markings of the preserved juice show that it is lifeless and useless. These diagnoses are not confined to food. Applied by experienced hands to human excreta they can detect the onset of the disease and determine its nature much earlier than is possible with a chemical or microscopical test. Many examples are given.

The injurious effects on animal life of constant assimilation of minute amounts of poison such, for instance, as spray residues contain is demonstrated as a result of prolonged large-scale experiments on mice. Foot and mouth disease in cattle and distemper in dogs can be surely cured by a preparation of coffee berries given by intravenous injection or through the mouth. As usual a snag bobs up. The roasting of the coffee must be interrupted at the precise point at which a specific change in the protoplasmic structure of the cells has occurred, or the remedy will be ineffective. This change can only be detected microscopically by an expert, and so far none has been trained. Moreover, the roasting has to be done by maintaining temperatures established for each stage of the process, and these may be incorrect if a variety of coffee other than that used by Steiner (not disclosed) is employed. Details of many cures during foot and mouth epidemics in Germany are cited. In the final chapter, world agriculture of the future is envisaged as a harmonious blend of Agriculture, Medicine and Education. An agriculture devoid of chemicals and a

medical science "able to look upon Man as standing on the Earth and reaching to the Heavens, the whole Cosmos reflected in his head and the Sun's forces circulating in his heart and the Earth power strengthening his limbs and streaming through his metabolic system". The task for education is to implant the "right" ideas about food, nourishment and plant cultivation in the minds of the young, and by the aid of literature to wear their elders from the grocers, druggists and fertilizer merchants who by way of the directions on the packet constitute their present instructors. Paper, printing and the profuse illustrations are of the best. The production is admirable but the high retail price will put the book out of the reach of many who might have been minded to try some of the experiments for themselves and, who knows, have been converted.

G.St.C.F.

497. LOWSON, J. M. (HOWARTH, W. O., AND WARNE, L. G. G.). 58

Textbook of botany.

University Tutorial Press Ltd., London, 1945,
 9th edition (reprinted 1946), viii + 584 pp., 8 plates,
 and 413 diagrams and illustrations, 13s. 6d.

That this book is now in its ninth edition testifies to its popular appeal to students of botany. Its scope is such as to meet the requirements of students for University Intermediate, Higher School Certificate, First Medical, Veterinary and Pharmaceutical examinations. It covers in outline the whole field of plant life and there is no attempt at specialization, which is an advantage in a general text-book. References to horticultural practice for instance are given only in passing or merely mentioned as examples of the principles of plant physiology. If it is realized that this book is not for specialists the student will find it most useful either as a basis for future specialized work or as a book for study and reference at a reasonable cost. The specialist botanist who has lost touch with other aspects of plant life will find much here to serve as a "refresher course", for recent advances along various lines are incorporated. The present edition has been revised and largely rewritten by Drs. Howarth and Warne of Manchester University. It can be thoroughly recommended to botanical students because of its clear and accurate descriptions, its numerous good illustrations and its low price.

498. REBOUR, H. 634.3
Les agrumes. (Citrus [in North Africa].)
 Union des syndicats de producteurs d'agrumes
 d'Algérie, 12 Boulevard Baudin, Algiers, 1945,
 pp. 426, bibl. 83.

This book by the chief Government Horticulturist in Algeria, while written primarily for the citrus grower and intending grower in North Africa, will by reason of its practical character have a very much wider appeal.

After listing, with brief description in each case, the citrus species grown in North Africa and giving a key for their identification, the author notes the uses for which they are chiefly grown. A consideration of world production and demand leads to his conclusion that North Africa has the climate and conditions necessary to produce citrus fruits for successful competition in world markets. Next, in detail he considers choice of site and choice of species and variety. Oranges are at present the most grown species but, in the author's opinion, lemon growing might well be extended. Mandarins and Clementines are popular enough but are not very successfully transported, while the popularity of grapefruit was increasing in France before the war. The varieties, available and desirable, of the different types are considered. Work prior to planting, lay-out of plantations, windbreaks, choice of rootstock, preparation of the soil and actual planting are detailed. Incidentally, in discussing the many rootstocks now available the author favours the sour orange (*Citrus aurantium amara* var. Bigaradia). He notes Mauri's work on the use of the polyembryonic character

of this tree and regrets that the practice is as yet not well known. He then takes his readers through all the work of the plantation and considers in some detail picking, yields, transport, packing and sale. Finally he gives useful notes on fruit tree regulations in North Africa with copies of certain forms and regulations and, in the last few pages, the titles of research or administrative officers likely to be of use to the citrus grower in Tunisia, Algeria and Morocco.

499. (SPRYGIN, I. I.) 633.88
Medicinal plants of the Penza province. [Russian.]

Penza Botanic Gardens, Penza, 1945, 6 roubles, from review in *Priroda*, 1946, No. 3, pp. 95-6. The book contains descriptions of all the medicinal plants growing in the Province. It explains how the plants should be collected and prepared, and how they are used in medicine.

500. VAN DER STRAETEN, E. 633/635(675)
L'Agriculture et les industries agricoles au Congo belge. (Agriculture and agricultural industries in the Congo.)
Compagnie du Congo pour le Commerce et l'Industrie, 13 Rue Bréderodé, Brussels, 1945, pp. 355, 179 francs.

A useful comprehensive treatise on agriculture in the Belgian Congo. It deals with soil, agriculture and its evolution—including research. It discusses in some detail the cultivation and in some cases processing of the following crops:—oil palm, hevea, coffee, sugarcane, cacao, rice, tea, maize, soybean, groundnut, cotton and other fibres, fruit growing especially bananas and citrus, cinchona, castor bean, pyrethrum, derris, tobacco, essential oil plants, timber. The effects of the war and future prospects are also considered in appendices.

501. TRESSLER, D. K., AND EVERS, C. F. 664.8.037
The freezing preservation of foods.
Avi Publishing Co., New York, 1946, pp. 932, figs. 209, bibls., \$10.50.

Whereas in Great Britain the preservation of food by freezing has been confined mainly to imported meat, in the U.S.A. it has become a many-sided industry. Starting with frozen fish in about 1865 it had extended to poultry, eggs, meats, fruits (about 1905), vegetables (about 1930), and even to fully prepared and cooked foods of many different kinds. So far as literature is concerned, the industry has been served by a large number of bulletins issued by University Agricultural Experiment Stations and State Departments and by innumerable articles scattered throughout technical and trade journals, but developments have been so rapid, especially in the last 20 years, that few writers have attempted to render an account of them in book form. In fact, so far as we are aware, the book under review by Dr. Tressler and Mr. Evers is the only one devoted wholly to frozen foods, and it is evidence of the industry and enthusiasm of the authors, as well as of the growth of public interest, that three editions have appeared in less than 10 years with only three years between the second and third.

It now seems as if the authors may have gained a little breathing space, as the present edition, taken in conjunction with their more popular work "Into the Freezer—and Out" (also Avi Publishing Co.), would appear to cover almost every aspect of food freezing—suitable varieties, preparation, freezing plants and methods, packaging, storage (including locker-plants), transport, cooking, quality control, nutritive value, specifications and government regulations—and should thus act as guide to the technician for some time to come.

The authors write with all the authority of those who have an inside working knowledge of the industry and have grown up with it. They explain in the preface that, after having enlarged the scope of the subject matter from a consideration of frozen fruits, fruit juices and vegetables

only in the original book (published under another name in 1937), to include meat, poultry, fish, shell fish and dairy products in 1943, they have now almost rewritten the book and have added chapters on the economic status of the food-freezing industry, home-freezing and home freezers, the freezing of cooked foods, and the microbiology of frozen foods in relation to plant sanitation.

Naturally the new economic section deals mainly with conditions in the U.S.A. and the statistics in it apply to that country, but it can be of interest to non-American readers as illustrating what might possibly find a parallel in their own countries, albeit with special modifications to suit local conditions. The authors are confident that freezing will become the most important method of food preservation, if only because it is the best method of preserving the quality and nutritive value of many kinds of foods. They consider that frozen foods will find their way into every home just as canned foods do now, since, contrary to the general belief, freezing is not an expensive operation: it is in storage, transportation and marketing that the costs mount and these are likely to decrease as the size of the industry increases; moreover, the last two processes are eliminated in home freezing, just as they are in home canning. Of the other new chapters, that on microbiology outlines the bacteriological precautions to be taken in preparing foods for freezing and emphasizes the necessity for the prompt consumption of frozen foods.

Although the 1943 edition was well illustrated, the number of illustrations has now been increased and many of the old ones changed—perhaps not always for the better. There are also copious references to literature at the end of each chapter and, in spite of the revision and additions, the book is still of the same handy size, a result achieved by the use of closer type and lighter paper; altogether it is an essential handbook for everyone connected with the technical side of the food freezing industry. T.N.M.

502. WEST MIDLAND GROUP ON POST-WAR RECONSTRUCTION AND PLANNING. 711.16(424.4)
English county, a planning survey of Herefordshire.

Faber & Faber, London, 1946, pp. 266, 21s.

This really splendidly produced book sets out in a comprehensive and clear manner the natural features of the county and the related development of communities, industries and communications. The aim of the survey is two-fold—"to provide a groundwork of facts upon which those responsible for planning in the County and the West Midland Region may base their schemes, and to describe a technique of investigation which may usefully be applied to a wider field"—but the information made available is invaluable to all who live in the county or who are proposing to do so.

The introduction outlines the composition of the West Midland Group and tells how the survey was conducted. The first six chapters cover the land, its structure, climate and geographical features, the next three are devoted to the people, population distribution and changes, the next six survey the economic life of the county in two sections, Industry and Agriculture, and the final chapters (five) deal with social environment and public services. Appendices range from soil groups and land classification to notable villages and archaeological remains and an extensive index makes the varied information contained in the book readily accessible. The book is lavishly illustrated with diagrams, photographs and coloured pictures, and a road map of the county occupies the inside of the front cover. Hereford is mainly concerned with agriculture and horticulture, and the industries developed in the county are largely supplemental to these occupations.

On the horticultural side the Group shows evidence that there is room for expansion of vegetable growing, especially those crops that can be fitted into the normal farming rotation. Increased acreages during the war years show

what might be done, but there is a need for better marketing facilities to encourage this movement. It is unfortunate that the acreages of fruit trees was taken from the 1936 census and that the more informative census made in 1944 was not available. The Group draws attention to the deficiencies of the earlier census and points out the need for a census based on age of tree (as was the 1944 census), from which an estimate of production could be drawn. In 1880 the county was foremost in orchard acreage, but since then there has been a steady decline. Plums are still well cared for, but apples, especially cider varieties, are very neglected and old. If the county is to develop as it should in fruit production, a minimum planting of 5,000 apple trees a year is essential. While some of the possible areas that might be so planted are pointed out, the group considers that a comprehensive survey ought to be made dealing especially with soil and liability to spring frost injury. There is room for fruit juice industries and the full development of soft fruit growing will depend on the development of canning and jam-making industries. Hops are likely to remain an important part of the county's agriculture.

The provision of adequate amenities and housing for agricultural workers is realized and suggestions are made for the systematic replacement of obsolescent houses by modern buildings in keeping with the scenic beauty of the county. The group considers that proper planning is impossible without "some far-reaching system of state control of the development of land".

The scope of this book is so wide that it is hard to think of anyone who would not derive benefit and enjoyment from reading it, and yet it provides enough detailed information to satisfy the seriously-minded student of horticulture and related sciences. We look forward to the publication of further surveys by this very active Group. H.B.S.M.

503. WHYTE, R. O. 633/635: 581.02

Crop production and environment.

Faber & Faber, London, 1946, pp. 372, plates 32, text figures 53, 25s.

This is a compilation of recent work on morphogenic problems such as photoperiodism and vernalization, and may be read with profit by those wishing to be acquainted with new advances in developmental physiology. The author has presented an impressive body of data never before brought together in a single book. There is in it much information on the control of plant growth and development by such factors as temperature and light, but so little on crop production that the title is somewhat misleading.

The method employed has been to incorporate in the text verbatim long passages from original publications, but as quotation marks are omitted it is not possible for the reader to discriminate between the comments and judgments of the author and those of the research worker quoted. It is only in passages in which the original author expresses uncertainty that the onus is thrown back on him by inserting quotation marks. The result is not altogether satisfactory since many conflicting statements appear without comment, and no effort is made either to reconcile or elucidate these contradictions. In the Introduction the author disclaims any attempt at "sweeping generalizations" which under the circumstances is becomingly modest; but by avoiding the necessity for grappling with the difficulties of the problems handled the chief use of a work such as this has been lost to the general reader, for it is impossible to discover what is well founded and what is mere conjecture.

In dealing with the problems of growth and development it would appear to be desirable at the outset to define the terms to be used with the utmost rigidity: in this respect Chapter II is not very helpful. Too much play is made with the notion of "phasic development" derived from Lysenko, without dispelling the vagueness in terminology and theory of the Russian original. This is no place for a detailed examination of such matters; but it must be quite evident to the reader

that the last section of Chapter II has been inserted as an afterthought, for it cannot be reconciled with statements occurring later, e.g. on page 56, where it is categorically stated that ripeness to flower is not "recognizable externally", and again on page 76.

Some serious misprints occur which altogether alter the sense of the statement quoted: thus on page 163 the statement "the auxin is detectable in the embryo either during development or during germination" conveys a very different meaning when either, or, are replaced by neither, nor, to conform with the original. The book is profusely illustrated, but the descriptive legends are in some cases so meagre that they become mere embellishments of the text. In spite of blemishes the book should find a place on the shelves of serious research workers, for the matter dealt with is intrinsically interesting, the bibliography is ample and the production excellent. A great deal of work which has been done in the Soviet Union is made available to British readers so that the contribution by the Russian physiologists to developmental physiology can be more fully assessed. F.G.G.

504. BRITISH COLUMBIA DEPARTMENT OF AGRICULTURE. 63(711)

37th Annual Report of the Department of Agriculture, British Columbia, for the year 1942, 1942, pp. 144; 38th A.R. for the year 1943, 1943, pp. 152; 39th A.R. for the year 1944, 1944, pp. 76; and 40th A.R. for the year 1945, 1946, pp. 186.

These excellently produced reports give particularly useful accounts of all phases of agricultural production and of investigational work on particular problems in the Province during the years in question. As may be expected, considerable space is devoted to horticulture including fruit and vegetable production and vegetable seed production. The three publications of the Department, namely, the annual reports of the Department, of Agricultural Statistics and of Climate, give as full an account of the agriculture of the Province as anyone could desire. [The Bureau often receives enquiries on agriculture in British Columbia. I can give no better advice than to study these reports.]

505. BRITISH COLUMBIA, DEPARTMENT OF AGRICULTURE. 63:31(711)

Agricultural Statistics Report year 1942, 1943, pp. 39, year 1943, 1944, pp. 40 and year 1944, 1945, pp. 42.

The statistics given in these reports relate to areas under cultivation of different agricultural crops, vegetables, tobacco, etc., and to production of such crops and of fruit and processed fruits in the different parts of the Province.

506. KALSHOVEN, L. G. E. (BUITENZORG EXPERIMENT STATION). 63(92)

Rapport over het algemeen proefstation voor den landbouw te Buitenzorg gedurende het eerste deel van den bezettingstijd (Maart '42-September '43). (Report on the Buitenzorg experimental station during the first part of the occupation (March '42-Sept. '43). Landbouw, 1946, 19: 17-31.

An account of the Buitenzorg experiment station with reference to changes in staff and work carried out on the Station and at the Institutes for culture technique, plant diseases and soil science, during the first part of its occupation by the Japanese.

507. TOKOPEUS, H. J. (BUITENZORG EXPERIMENT STATION). 63(92)

Verslag over de werkzaamheden van het Plantkundig Instituut van het Algemeen Proefstation voor den Landbouw gedurende de periode Maart '42-15 Augustus 1945. (Report on the activities of the Plant Science Institute of the Agricultural Experiment Station [at Buitenzorg] from March '42 to 15 August 1945.) Landbouw, 1946, 19: 70-5.

This report forms a supplement to that of Dr. Kalshoven (see above, No. 506) and continues the history of the Station from March, 1942, until the end of the Japanese occupation. Changes in staff are mentioned, and the work carried out on several tropical and sub-tropical crop plants is outlined.

508. CAWTHRON INSTITUTE. 633/635(931)
Annual Report of the Cawthron Institute 1945-46,
 1946, pp. 39.

The work of the Institute in this, its Silver Jubilee year, is discussed under the following headings: (1) Soil investigations. A report was issued on soil erosion in the Monterey Hills Orchard district. (2) Mineral deficiency investigations. An improved Titan yellow method for estimation of magnesium down to 0.0025 mg. magnesium was found satisfactory. Improvements on Carolus' methods for tissue-testing apple, tobacco and tomato leaves are reported. (3) Fruit research. In apple areas showing magnesium deficiency and treated in 1939/40 and 1940/41 ground dolomite residuary results are more persistent than those of magnesium sulphate or carbonate, the sulphate being least satisfactory. Analysis of apple samples indicates that some varieties, e.g. Sturmer, retain copper spray residues much more tenaciously than others, such as Dunn's. Out of 7 varieties tested, including Cox, Sturmer contained nearly twice as much vitamin C as its nearest rival, Granny Smith, at picking and nearly three times as much after storing for 6 months, the loss during storage in Sturmer being negligible. Dieback in apple and its various agents are being studied. An early spring application of Elgetol to dead leaves under pear and apple trees resulted in reduced scab attack on these trees. So far it has not been found possible to establish codling moth parasites imported from Canada on a useful control scale. The sowing and later discing in of subterranean clover shows promise of improving the N supply in apple orchards. Double Vigour stock French Crab Seedling (vegetatively propagated) continues to give better results than Spy with the apple varieties tested. Trials on various potassic manuring of raspberries are reported. A disease survey of raspberries shows that the most important fungi occurring on unhealthy or dying plants are silver leaf, white root rot (*Rosellinia* sp.), a *Nectria* sp. and cane wilt (*Leptosphaeria coniothyrium*). (4) Tomato investigations. Steam sterilization of glasshouse soil was followed by higher yields than sterilization by formalin. A comparison of the addition to heavy glasshouse soil of steamed compost (stack bottom), charcoal, sand and sawdust from *Pinus radiata* showed good effects from the first two, negative effect from sand and deleterious effect—in the first season at all events—from sawdust. On outside tomatoes sand proved more useful. Heavy watering again proved successful. Results on "cloud" observation confirm those of previous years in showing increased cloud with heavy watering, steam treatment and with the use of fertilizers. For outdoor soils chloropicrin, steam and formalin 2% proved about equally efficacious. The highest percentage of hardcore was found to occur in plots which received no fertilizers or no potash in the fertilizer. Other factors are discussed. (5) Tobacco research. Experiments cover soil surveys, ageing, nutrition, soil analysis effects, and diseases including mosaic, black root rot, damping off, angular leaf-spot and collar rot. (6) Entomological investigation. Considerable biological control work is reported: on St. John's wort with *Chrysolina hyperici*, piri-piri with *Antholcus varinervis*, gorse with the seed weevil. (7) Division of Entomology. Plant Research Bureau (D.S.I.R.). Work is reported on parasites of the diamond-back moth and of the white butterfly.

509. CHESHUNT. 631.544: 635.64
Thirty-first Annual Report Cheshunt Experimental and Research Station 1945, 1946, Turner's Hill, Cheshunt, Herts., pp. 98.

Director's report. Under Cheshunt conditions and practice

the substitution of muriate for sulphate of potash for tomatoes has proved satisfactory for the past 5 years. Yields of tomatoes following a complete base fertilizer after steaming were identical with those following the application of sulphate of potash only. The effects of adding flowers of sulphur were compared with those of treating the soil with H_2SO_4 and found to be the same except for retardation of early growth in tomatoes following H_2SO_4 . Notes are given of characteristics shown in tomato variety trials. Tomatoes were again successfully grown in cucumber houses. *Plant diseases.* Considerable attention was paid to *Verticillium* wilt both in tomato and cucumber, the organisms concerned being *V. albo-atrum* and *V. dahliae*. Work continued on stem rot caused by *Didymella lycopersici*. Attacks were more severe in soils steam-sterilized before planting than in non-sterilized soils. The spread of the disease by air-borne spores was demonstrated. Investigation is being made into the possibility of treating the soil surface in glasshouses with fungicides before planting out. Work on virus diseases continues. Evidence has been obtained indicating that fruiting tomatoes may, under certain conditions, show marked resistance to invasion by mosaic viruses. These indications are being followed up. Work is reported on the control of plant diseases by microbial antagonism, the object being to control certain diseases by bulk cultures of the appropriate antagonistic organism. The present investigation is confined to the use of penicillin and clavatin, both pure and in cultures of the creative organisms, *Penicillium notatum* and *Aspergillus clavatus*. *Animal pests.* Considerable success crowned attempts to control red spider (*Tetranychus telarius*) early in the growing season in tomato houses with petroleum emulsion. A certain amount of *Oedema* occurred. Work continues on the control of green fly (*Aphididae*) on lettuce by HCN fumigation. Preliminary experiments are reported on host-transference of green fly belonging to the genus *Macrosiphum*. A rare occurrence [for Britain and Europe] is noted, namely, the discovery of males of the onion thrips (*T. tabaci*) on leeks near Cheshunt. It was found possible to reduce eelworm galls by application to the soil of sodium ethyl xanthate solution, but the consequent check to growth was excessive. Large-scale trials show DDT valuable for the control of tomato moth caterpillars. Trials on a commercial scale show that magnesium deficiency in tomatoes is effectively controlled by spraying periodically with a 2% by weight solution of Epsom salts with a suitable wetter. The effects of omitting the elements magnesium, manganese, iron and boron from tomato plants has been observed and is here noted. The effect of hormones on the setting of tomato fruits has been studied and the application of β -naphthoxyacetic acid at a concentration of 35-50 p.p.m. in water with a suitable wetter is recommended. Promising results have also followed the use of α -2,4-dichlorophenoxypropionic acid. Experiments on the possible relation of the potash and phosphoric acid in tomato soils extracted by 1% citric acid and 0.5N acetic acid respectively indicate that there is no hard and fast relationship.

510. IRRIGATION RESEARCH STATION, GRIFFITH. 631.67

Soils and Irrigation Extension Service. Second Progress Report—to 30.3.46, 1946, pp. 9.

The work is described of the Soils and Irrigation Extension Service operated by the Irrigation Research Station, Griffith, in the Murrumbidgee Irrigation Areas, New South Wales. Its most urgent objects are the prevention of salting by controlled irrigation, the reclamation of salted land and the introduction of cultural practices to maintain soil fertility.

511. IRRIGATION RESEARCH STATION, GRIFFITH. 631.67

Annual Report Summary, Irrigation Research Station, Griffith, N.S.W. for 1945-46, 1946, pp. 4 (mimeographed).

(1) Field experiments with fruit trees. The permanent field

experiments with orange trees carried out on the Station's ground are supplemented by experimental plots on settlers' farms. (2) Irrigation investigations. In irrigating vegetable crops it is a particular problem to soak the top of the ridges where the seeds are placed without applying too much water. The effect of the depth of water in the furrow on the time of soakage necessary to wet the top of the bed has therefore been studied. Investigations in progress include causes of the seasonal variation in the soakage rate of soils, the effect of the initial soil moisture on the soakage rate and the effect of cultural treatments. (3) Drainage investigations. Two farm-size, tile-drainage trials initiated to overcome water-logging and salting are being carried out on two major soil types. (4) Soil reconditioning investigations are in progress to determine the nature of the alarming soil structural changes associated with constant orchard tillage. (5) Vegetable investigations. The value of a cultivated and irrigated spring fallow in supplying the nitrogen needs of vegetables has again been demonstrated. The incorporation of rice hulls into a heavy soil proved beneficial for peas and tomatoes, the latter responded also to applications of gypsum. The interplanting at close spacing of early and late tomato varieties was shown to increase per acre yield as compared with standard practice. Time and depth of ploughing has been found to affect carrot growth on heavy soils. (6) The Soils and Irrigation Extension Service, see *H.A.*, 16: 1310.

512. SALMON, E. S. (EAST MALLING RESEARCH STATION). 633.79
Twenty-seventh report on the trial of new varieties of hops, 1945, East Malling Research Station, Maidstone, Kent, 1946, pp. 14, 6d.

Yield figures are presented for 82 new varieties of hop, one of which (Bullion Hop) cropped at the rate of 27 cwt. to the acre, five others yielding 20½-22½ cwt. The number of bushels of green hops required to the cwt. of dried hops varied from 74 to 129. A number of the new varieties show high resin content and/or a relative resistance to downy mildew in Britain and elsewhere. To meet the brewers' requirements the existing acreage cropped to the new hop varieties would have to be considerably enlarged. The urgent demand for a hop experiment station in the Weald of Kent is repeated.

513. LIGHTFOOT, G. 6(94)
C.S.I.R. [Australia]—1945.
Council for Scientific and Industrial Research, Melbourne, 1945, pp. 98.

This "review of progress and preview of problems to be tackled" in Australia includes articles on Plant industry (pp. 10-14), Entomology (pp. 15-19) and Irrigation settlements (pp. 37-41). [A more detailed and technical account of the C.S.I.R. activities may be found in its annual reports, regularly abstracted in this journal.]

514. GOLD COAST COLONY. 633/635(667)
Report on the Department of Agriculture, Gold Coast Colony for the year 1945-46, 1946, pp. 12, 1s.

Cocoa. Nearly all interest is centred on swollen shoot disease, its control and prevention. *Citrus research*. Surveys of the lime-growing areas in the Asebu-Abakrampa area showed a serious decline in lime population throughout the area and in all age groups. The method and rate of spread of *Ganoderma lucidum* are under investigation. The possibility of lime-induced chlorosis in lime plantations is being studied with the help of spectrographic examination in England. At Asuansi Station grapefruit and other sweet citrus budded on sour orange stocks continued to die out. Lemons on sour orange continued to thrive. Planting of the rootstock trial is expected to start in 1947. Separate reports are included from the Northern Territories, Ashanti, Eastern Province, Central Province and Western Province.

515. IMPERIAL AGRICULTURAL BUREAUX. 63
Report of Proceedings Imperial Agricultural Bureaux Conference, London, 1946, H.M.S.O., London, 1946, pp. 71, 1s. 3d.

The work of the two Institutes and of the ten Bureaux surveyed and recommendations are made for development

516. IMPERIAL COLLEGE OF TROPICAL AGRICULTURE. 633/635(729)
Report of the Imperial College of Tropical Agriculture, Trinidad for the year ended August 31st, 1945, 1946, pp. 31.

Very brief notes are given of the work in the different departments. *Botany*. Breeding of bananas and bean cacao selection. *Entomology*. Cacao pests, biological control of the weed, *Cordia macrostachya*, and of the banana weevil (*Cosmopolites sordidus*), control of tropical cabbage worm (*Ascia monuste*). *Mycology*. Witches Broom and viruses of cacao, *Fusarium* wilt of okra (*Hibiscus esculentus*). At the Low Temperature Research Station work on the respiration of banana fingers in different oxygen-nitrogen mixtures is now ended and the data will shortly be published.

517. INSTITUTE OF PLANT INDUSTRY INDORE. 633.51+633/634(547.7)
Progress Report of the Institute of Plant Industry for the year ending 31st May 1944, pp. 32 and ditto for the year ending 31st May 1945, pp. 30.

The primary object of the Institute is investigation into matters relating to the production of raw cotton in India. Among other crops with which it is necessarily concerned are groundnut, soybean, tobacco, chillies, linseed and peas.

518. ROYAL BOTANIC GARDENS, KEW. 58.006(42)
Kew Bulletin, 1946, No. 1, pp. 48, 2s. 6d.

We welcome the re-appearance of the *Bulletin of Miscellaneous Information*. *Kew Bulletin* had long been its unofficial title; it now becomes adopted officially. A brief account of activities during the war shows that Kew was not severely damaged by raids and that part of its work on behalf of the war effort concerned fibres, rubber and potato propagation.

519. MISSISSIPPI. 633/635(762)
Fifty-sixth Annual Report of the Mississippi Agricultural Experiment Station for 1943 (Highlights of the Mississippi Experiment Station), 1944, pp. 54, and *Fifty-seventh Annual Report of the Mississippi Agricultural Experiment Station for 1944*, 1945, pp. 52.

Both these reports are of the same nature, giving brief notes of the more striking features of the Station's work. The earlier one, in particular, is concerned with adjustments to war conditions. In the 1944 report notes are given of the particular work at the sub-stations. Among them the following would appear to be most interesting to horticulturists:—The Delta Branch Station at Stoneville, subject including cotton, horticulture, etc.; the Tung Experimental Field; the Truck Crops Branch Station at Crystal Springs.

520. NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING. 633.491-1.556.4
Report of the N.I.A.E., Askeham Bryan, for the year ending August 31st 1946, pp. 14, 3d.

The chief item of immediate interest to horticulturists consists of brief notes on successful trials with an elevator potato digger. The fact that this machine cannot be used on heavy wet or sharp and stony soils is due to defects in the elevator chain. It is hoped that a German machine in which a reciprocating bed replaces the chain altogether will shortly be available for trial. Notes are also given of a machine for fertilizer placement experiments with potatoes.

521. NEW ZEALAND DEPARTMENT OF AGRICULTURE.
63(931)

Annual Report of the Department of Agriculture, New Zealand, for 1945-46, 1946, pp. 78.

Our interest here lies in the report by W. K. Dallas, Director of the Horticulture Division, on pp. 68-76.

Area and number of orchards. There are in New Zealand only 9 orchards of over 50 acres as against 1,136 of 1-5 acres. The total acreage under top fruit is 18,200 divided as follows:—apples 10,000, pears 1,000, stone fruit 5,000, lemons 900, other citrus 1,000 and other tree fruits 200. Production in 1945 amounted to approximately 2.3 million bushels of apples, 364,000 of pears, 558,000 of stone fruit and 167,000 of citrus fruit. The cool-storage space available for fruit in New Zealand has a capacity of 1,105,100 bushel cases. 660 nurseries, a rise of 17 from the previous year, were registered. The opportunity offered to those interested in the cut flower trade is noted. With the return of officers from overseas more attention was given to orchard instruction and inspection. Notes are given on the incidence of brown rot and other diseases and of codling and other moths. *Small fruits.* There is room for expansion to meet the demand here. Chinese gooseberries and feijoa are now being planted on a larger scale than before. *Viticulture.* Not a good season for outdoor grapes. The amount of wine produced and consumed in New Zealand has risen from 185,000 gallons in 1940 to 357,000 gallons in 1945. The production of cider in 1945 was 87,000 gallons. *Tobacco.* The acreage cropped rose from 3,093 in 1944 to 3,383 in 1945. This is all in the Nelson Province. *Hops.* The industry remains stationary, the area under hops in 1945 being 621. *Beekeeping.* There are at present in New Zealand 6,507 beekeepers. They own 9,445 apiaries which contain 129,576 colonies. Research work includes the use of pollen substitutes, humidity in relation to low specific gravity and fermentation of honey and the effect of DDT on hive bees. *Experimental work.* Work is in progress on hazel nuts, selection and crossing; selection of sunflowers; physiological problems in raspberries.

522. THE NORTHERN HORTICULTURAL SOCIETY.

63/635(42)

The Northern Gardener, 40 Brazennose Street, Manchester, January 1947, Vol. 1, No. 1, pp. 20, 1s. 6d.

We welcome the appearance of this new horticultural journal and wish it every success. In the past, almost inevitably, the leading English horticultural journals have been concerned more with conditions in the south than with those in the north of England. The aim of this newcomer is to cater first and foremost for the northerner. The Society responsible, now nearly a year old, already counts among its members many of the leading horticulturists of the country. Its opportunity for useful work is immense and it has made a promising start with the inauguration of the *Northern Gardener*. Articles by experts in the present number concern potato diseases, deep versus shallow tillage, onion cultivation.

523. ONTARIO DEPARTMENT OF AGRICULTURE.

63/635(713)

92nd Annual Report of the Horticultural Societies, 1945, Toronto, 1946, pp. 59.

The report includes concise papers by Canadian and United States experts on new weed killers, control of plant diseases, and horticulture in post-war living. In this last article reference is made to the possibilities opened up by gas storage, hormone research, DDT, Fermate, and breeding with the aid of such substances as colchicine.

524. QUEENSLAND DEPARTMENT OF AGRICULTURE AND STOCK.

63(943)

Annual Report of the Queensland Department of Agriculture and Stock for 1944-45, pp. 40.

Brief summary accounts are given of horticultural work on pineapple manuring and storage, citrus nutrition, papaw breeding, vegetable problems including non-setting of tomatoes, pest and disease control. A report is included on the work of the Committee of Direction of Fruit Marketing. The rapidly expanding ginger crop on the North Coast is noted. Field work is in progress on this crop at Buderim and at Nambour.

525. QUEENSLAND ACCLIMATISATION SOCIETY.

63/635(943)

The eightieth Report of the Queensland Acclimatisation Society from 1 July 1945 to 30 June 1946, Brisbane, pp. 8.

A gloomy report owing to circumstances arising out of the war and inclement weather.

526. SOUTH AUSTRALIA.

63(942)

Report of the Minister of Agriculture, South Australia, for the year ended 30th June 1944, 1946, pp. 33.

Reports are included of the work at Blackwood and Fullarton Experimental Orchards, Berri Experimental Orchard, the State Viticultural Station at Nuriootpa and at the Roseworthy Agricultural College. At Roseworthy considerable attention is paid to the production of port, sherry, hock, claret, burgundy, madeira and muscat type wines. Recent progress towards the production of a satisfactory sherry is noted.

527. TUCUMAN.

63/635(824.5)

Memoria anual del año 1944. (Annual Report of the Tucuman (Argentina) agricultural experiment station for 1942.)

Rev. industr. agric. Tucuman, 1946, 36: 5-85.

This, the annual report of the Director, Dr. W. E. Cross, includes items of horticultural interest by E. F. Schultz, horticulturist (pp. 28-57), G. L. Fawcett, botanist (57-60) and K. J. Hayward, entomologist (60-72). *Citrus.* A study of rootstocks has been undertaken with special reference to the root rot of grafted sour orange stocks. This disease, causing serious losses in neighbouring provinces, has not yet appeared in Tucuman—suspected cases being found to be due to other causes—but rootstocks to replace the sour orange, if this should become necessary, are being investigated. Tables are given to show the yields obtained from varieties on sour orange and other rootstocks. *Tung.* The yields from plants selected for nursery propagation have been very good during the year. One plantation of 3-year-old grafted trees from the nurseries has provided an average yield of 5.2 kg. per tree. A new plantation of *A. fordii*, of trees grafted at soil level, has grown vigorously in spite of prolonged drought. *A. moluccana* has developed satisfactorily but less vigorously than *A. fordii*. It has been used as a rootstock for the latter but the plants were not so vigorous as those on *A. fordii*. *A. montana*, grown under conditions similar to those of other classes of tung grew well but rather slowly. *Flax.* Experiments were carried out on certain problems relating to artificial irrigation and time of sowing; the most satisfactory growth was obtained from seed sown on the 15 and 23 of May. The plants showed no injury from relatively severe frosts of 3-7° C. and 2-4° C. on 9 July and 17 August respectively. *Diseases.* A disorder of oranges, suspected at first of being caused by a virus, proved to be a result of irrigation with water containing saltpetre. The problem of controlling "peste negra" of tobacco and tomatoes depends on success in combating the thysanopterous vector of the disease; no satisfactory insecticide has yet been found; experiments with D.D.T. gave indifferent results. The Department of Entomology is continuing the propagation and distribution of toads and insects useful for the control of pests of agricultural crops.

528. UGANDA DEPARTMENT OF AGRICULTURE.

633/635(676.1)

Annual Report of the Department of Agriculture, Uganda, for the period 1 July 1944-30 June 1945, Part II, 1946, pp. 60, sh. 3/-.

Here are contained the separate, concise reports of the different specialists, reports on food crops and reports on experimental work in Buganda and in the Eastern and the Western Provinces. Most of the report of the economic botanist is devoted to coffee problems including selection, costings, pollination. Cinchona plots continue to flourish. Notes are given by the entomologist on particular pests of banana, cassava, coffee, beans, pyrethrum, tobacco, castor oil, eucalyptus and stored products. In the Eastern Province arabica coffee cultural trials include pruning and spacing, shading and mulching, spacing and uprooting tests. In the Western Province cultural plots of both arabica and robusta are under observation. Tobacco and cinchona are also being tested. In small trial plots, where the altitude precludes the growing of a number of oilseeds, sunflowers gave satisfactory yields.

529. WÄDENSWIL (KOBEL, F.).

633/635(494)

Jahresbericht 1945 der Eidg. Versuchsanstalt für Obst-, Wein- u. Gartenbau in Wädenswil. (Annual Report of the Wädenswil Horticultural Research Station for 1945.)

Reprinted from *Landw. Jb. Schweiz.*, 1946, 6: 191-209.

(1) *Physiology and breeding.* Fruit growing: In the collection of apple seedlings another thousand have come into bearing. It is the aim of the breeders to select some vigorous specimens, which are easily propagated by layers, in order to get a more vigorous stock than E.M. XVI for standard trees and to replace seedling rootstocks in the case of apple trees growing in sod. Viticulture: Attempts are being made to produce an early prolific blue grape which would be as successful as the cross Riesling × Sylvaner among the white varieties. In the field of strawberry breeding it is the Station's ambition to supply a variety that is even more suitable for quick freezing than Wädenswil III or Panther. The development of *Primula malacoides* continues. Sub-section: *Physiological chemistry.* The loss of vitamin C in fruits and vegetables was examined during the different stages of the quick freezing process. It was found that in most cases losses are greatest in the preparatory phases, while they are less marked during storage and thawing. Strawberries and currants were the products losing least of their vitamin C content, while fruits that contained little vitamin C anyhow, lost most of it by quick freezing. In the case of savory, cauliflower and beans, vitamin C losses are small, brussels sprouts show losses up to 50% and spinach up to 80%. In 50 apple and in as many pear varieties the vitamin C content of the 1945 crop was determined. As the result of the warm weather and the small crop the values were about 20% higher than in the preceding year. For the fumigation of apples with methyl bromide against San José scale the following minimum dosages are recommended: At 10° C. 16 hours, at 15° C. 6 hours and at 20° C. 4 hours with 1 vol. % of gas. Mature fruits are more susceptible to fumigation injury than unripe apples; varietal differences in susceptibility to the gas are considerable. Preliminary investigations show that healthy fruit tree rootstocks may be fumigated (1 vol. %) without suffering damage at 10° C. for 30 hours, at 15° C. for 12 hours and at 20° C. for 4 hours. (2) *Plant protection.* For a new method of evaluating winter washes in the open see *H.A.*, 16: 191. For the control of the cherry fruit moth DNC preparations proved superior to emulsified fruit tree carbolineum washes and slightly better than ordinary fruit tree carbolineum. In several cantons phylloxera control was complete, even in heavily infested areas, following an application of fruit tree carbolineum in winter, whereas untreated vines or those treated with DNC showed leaf galls

as early as April. The pea and bean weevil was effectively controlled by small dosages of DDT, which proved greatly superior to derris, while nicotine proved quite unsuccessful. Gammexane, in contradistinction to DDT and derris, was found to be very effective against certain cabbage pests in that it killed the eggs and young larvae in the interior of the plants. (3) *Chemistry and biology of beverages.* It was found possible to precipitate tannins in very astringent pear juices by undercooling the juice periodically (–40°–45° C). In the same manner cream of tartar is precipitated in very acid grape juices. The process is not injurious to the juice but not quite so rapid as fining. An addition of thiourea to grape must prevented the browning of the wine and rendered cherry juice concentrates stable in the air. The enzyme responsible for the browning of wines was isolated from cultures of *Botrytis cinerea* and identified as a polyphenolase. (4) *Fruit growing.* The apple varieties Red Delicious and Golden Delicious were released for propagation in suitable localities of the Waadt and the Valais. Walnut grafting experiments were continued and it was found that the pre-culture of rootstocks in pots over an extended period does not offer any advantage over growing them in the open. The latter method is simpler and yields more vigorous plants. The use of vigorous rootstocks and scions is recommended. Nursery grafting trials with walnuts have been discontinued as offering no prospect of success. The report contains further accounts by the sections: viticulture and wine manufacture, horticulture and fruit and vegetable utilization; it concludes with an account of Station activities and a list of publications by members of the staff.

530. BURGESS, A. H. (Editor) (WYE COLLEGE).

633.79

Hop growing, 1946. Conference report No. 1.

Wye College, Kent, 1946, pp. 59, 5s.

A conference on hop growing, organized by Wye College, Kent, was held at Wye in March, 1946. The report contains the papers read, including the subsequent discussions and the illustrations shown.

I. GAMBLE, W. H., AND LINNET, L. F.
Fuel economy in hop drying, pp. 4-12.

II. GRAY, C. J.
Design and operation of hop drying oasts using semi-producer furnaces, pp. 13-21.

III. AMOS, A.
Hop drying with oil-burners, pp. 22-5.

IV. BURGESS, A. H.
Steam for oast heating, pp. 25-8.
The points raised in the discussion of the first four papers, pp. 28-34, include drying by electricity, which has given promising results in the experimental stage and the use of oast houses for other purposes, for instance herb drying.

V. NOTT, J.
The application of mechanical power to the hop bagging machine, pp. 35-8.

VI. BOMFORD, J. F.
Mechanical hop-picking, pp. 38-45.
The author gives a detailed description, supported by photographic plates, of the hop-picking machine installed on his farm. He is a Golding grower, and Goldings, being the most delicate type of hop, do not lend themselves to machine picking nearly so well as Fuggles. Nevertheless, the labour cost per bushel was reduced to roughly just over one-third. A most enthusiastic comment is made on Bullion and other of the new Wye varieties, which seem to have been "produced for the picking machine".

VII. GRAY, C. J.

The picking of hops by machine, pp. 46-52.

Different types of machine, as used by Guinness, are described and illustrated and a record of their performance is given. One of the machines is of the portable type with a nominal capacity of $\frac{3}{4}$ acre per day. It is contended that the machines, as originally designed, are not a commercial proposition, but that the new design, to be completed shortly, will be much more economic than hand picking. The machine is expected to pick efficiently $1\frac{1}{2}$ -2 acres per day, using a labour force of 15-20 men. The effect of mechanized picking on the preservative value and wastage of hops is discussed.

The last 7 pages are taken up by a report of the discussion.

531. The following also have been examined:

- a BRITISH COLUMBIA DEPARTMENT OF AGRICULTURE.
Climate of British Columbia. Tables of temperature, precipitation and sunshine.
Report for 1944, 1945, pp. 26, and *for 1945, 1946*, pp. 27.
- b *Twenty-ninth A.R. National Research Council of Canada 1945-46*, 1946, pp. 65, being *N.R.C. 1411*.
- c IMPERIAL AGRICULTURAL RESEARCH INSTITUTE, NEW DELHI.
Scientific reports for the year ended 30 June, 1945, 1946, pp. 93, Rs. 1 10 as.
Of agricultural, rather than horticultural interest.
- d *Sixteenth A.R. Sugarcane Research Station, Mauritius*, 1945, pp. 17, 50 cents.

